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WHITE RIVER SHALE PROJECT

Community and Infrastructure Support Study

Prepared as the Supplement to the Detailed Development Plan

August 1981

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Community and Infrastructure Support Study

Prepared as the Socioeconomic Supplement to the
Detailed Development Plan

August 1981

Prepared by
Gibbs & Hill, Inc.

WHITE RIVER SHALE PROJECT

Community and Infrastructure Support Study

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EXECUTIVE SUMMARY

The White River Shale Project (WRSP) is a joint venture of three oil companies (Phillips Petroleum Company, Sohio Shale Oil Company, and Sunoco Energy Development Co.) to construct and operate an oil shale facility on federal tracts U-a and U-b in Uintah County, Utah.

This document has been prepared as a socioeconomic impact supplement to the Detailed Development Plan and describes the potential socioeconomic impacts that may result from the construction and operation of the White River Shale Project (WRSP). The text contains descriptions and analysis of existing infrastructural conditions of both Ashley Valley, Utah, and Rangely, along with a brief discussion of available social services, cultural background, budget information and the general tax bases of potentially impacted government entities. The potential impacts generated by WRSP direct and indirect employment on these services are also addressed.

The total direct WRSP employment is expected to peak at 5,083 workers in 1989. As the figures below indicate, the construction workforce is expected to reach 346 workers in 1985 and 3,797 in 1989.

	1985	1989	1994
Construction Workers	346	3,797	0
Operations Workers	369	1,286	3,353
Total Workers	715	5,083	3,353

The WRSP operation workforce build up is expected to be fairly gradual, reaching a peak of 369 workers in 1985. By 1994, the construction workforce is projected to be entirely phased out and the operation workforce is projected to reach 3,353.

The total peak population attendant to the direct WRSP workforce is projected to occur in 1991, when WRSP is estimated to employ 5,094 workers. Below are the projected total direct population numbers attendant to WRSP's direct employment for three years.

	1985	1989	1994
Direct Construction-Related Population	779	8,543	0
Direct Operation-Related Population	989	3,446	8,978
Total Direct Population	1,768	11,989	8,978

These particular years make good reference points because 1985 in Phase I is projected as the year for the Modular demonstrations to begin operation; 1989 is the year in which the construction workforce for the entire project reaches its peak; and 1994 represents the commercial operating phase.

The total indirect (secondary) employment generated by WRSP's direct workforce is projected to account for 297 persons in 1985, 6,143 persons in 1989, and 6,957 persons in 1994.

The total population generated by WRSP's projected direct and indirect employment impacts is estimated to account for a total of 2,065 persons in 1985, 18,132 persons in 1989, and 15,935 persons in 1994.

The White River Shale Project (WRSP) plans to operate and maintain a construction camp located on the tracts. The camp will remain in operation during the construction phase and will consist of a Recreational Vehicle Park and bachelor facilities. It is presently estimated that the entire single-status WRSP construction workforce, and some married couples, will be accommodated in these facilities. The bachelor facilities and the Recreational Vehicle Park on tracts will be dismantled once the construction of the entire project is complete. The community needs generated by these workers is expected to be minimal.

Many of the existing community services within Ashley Valley are presently insufficient when rated by national and/or other recognized standards. The school system, water and wastewater systems, and the medical services within Ashley Valley are currently utilized at or above capacity levels. Additional infrastructure will be needed, particularly for these services, just to meet the baseline growth expected in the Ashley Valley.

WRSP will have an additional impact on the requirements for services in Ashley Valley and Rangely, Colorado. WRSP direct population may bring into the Ashley Valley and Rangely areas the following schoolchildren:

	1985	1989	1994
Ashley Valley	205	1,169	896
Rangely	52	388	268
Total Schoolchildren	257	1,557	1,164

These schoolchildren may require a peak need of 2.4 additional schools and 47 additional teachers in the Ashley Valley. Because of Rangely's existing facilities, no additional schools and only 9 additional teachers may be required.

In addition to the school system, the WRSP direct population may generate needs for medical services. Twenty-three hospital beds and 11 physicians may be required in Ashley Valley during WRSP peak demand. For Rangely, WRSP peak impact may require 8 hospital beds and 3 additional physicians.

Water and wastewater treatment will also be needed for WRSP direct population. Water treatment for 1.2 MGD and wastewater treatment for 0.6 MGD during 1989 may be required in Ashley Valley to support WRSP direct population. This growth can be handled by Ashley Valley's

current expansion plans. In Rangely, WRSP direct population may require approximately 0.3 MGD of water treatment and 0.2 MGD of wastewater treatment during the peak year. Expansion of water and wastewater treatment already planned would more than meet the demand for WRSP's population.

WRSP's direct population may also generate need for solid waste disposal, utilities, police and fire protection, social services, recreation facilities, and transportation. Analysis of these needs for both Ashley Valley and Rangely is provided within the body of this document. This document also examines the impact of a high-growth scenario (assuming all six regional energy projects progress as planned) in the need for schools, teachers, public employment, fire and police protection, and many other community facilities and services.

The capacity of Ashley Valley and Rangely to raise the present level of services and to accommodate the increased needs will be enhanced by the increased revenue generated by the incoming project populations. The general tax base growth in Ashley Valley will be supplemented by the money that Uintah County will receive from WRSP's bonus and royalty payments, much of which can be used for local impact mitigation needs.

1.0 INTRODUCTION

The White River Shale Project, owned jointly by Sohio Shale Oil Company, Phillips Petroleum Company, and Sunoco Energy Development Co., is involved in the development of two federal prototype leases in Utah, tracts U-a and U-b. The project will mine raw oil shale with proven room and pillar mining techniques, crush the raw shale and then process the raw shale in surface retorts. The project calls for a staged development in three phases. Phase I will result in a net oil production of 14,840 barrels per day by the end of 1986. Operation of Phase II is planned to begin in 1989, expanding net oil production to 57,190 barrels per day. The Phase III operation of a 106,230 barrel per day commercial facility is expected to begin in 1993.

1.1 NATURE AND SCOPE OF REPORT

The purpose of this document is to provide a description of the socioeconomic environment of the area to be affected by the White River Shale Project (WRSP) and an assessment of the project's impact on this environment. Areas of potential impact include the economic environment, fiscal impacts, demands on infrastructure and community facilities and services, and potential changes to the social and cultural environment.

The assessment of socioeconomic impacts is based on three projections of economic and population growth:

- A baseline projection which assumes no energy projects in the region;
- An aggregate (high growth) projection which assumes that six Utah projects,* now in consideration, are implemented; and

*The six projects are: White River Shale Project; Tosco Sand Wash (oil Shale); Geokinetics (oil shale); Paraho (oil shale); Moon Lake Power Plant (coal-fired power generating plant); and the White River Dam (dam, reservoir, and hydroelectric power generation). In addition, new population induced by the development of Tracts C-a and C-b in Rio Blanco County, southeast of Rangely, will have significant impacts on the Rangely area. See Figure 1.1 for project locations, excluding C-b.

- A projection of WRSP-induced growth.

This document presents an overview of the potential impacts on the region. The projections are based on a combination of secondary data and primary investigation and analysis carried out by Gibbs & Hill for WRSP.

1.2 DELINEATION OF IMPACT REGION

It is expected that the employment for the White River Shale Project will come from a large regional base. This employment may have impacts on the four-county region of Daggett, Duchesne, Uintah and Rio Blanco (Colorado). Although workers may reside in Daggett and Duchesne Counties, these people are expected to primarily be existing residents. The vast majority of the inmigrants are expected to reside in Uintah County and, to a lesser extent, Rio Blanco County. This report, therefore, deals with the resulting impacts to Uintah County, especially Ashley Valley, and to Rio Blanco County. (See gravity model in Appendix F for details of methodology for determining the settlement of WRSP workers.)

Impacts to Uintah County have been evaluated in the context of its existing population, economy, tax base, and absorption capacity. The study has focused on the Ashley Valley, since it was assumed that most of the new growth induced by energy-related developments, including that of WRSP, will be attracted there. (See Figure 1.1 for location of Ashley Valley.)

Likewise, the impacts to Rio Blanco County have been evaluated in the context of its existing population, economy, labor force income levels, and absorption capacity. (See Figure 1.1 for location of impacted area in Rio Blanco County.)

Predicated upon the model developed by Gibbs & Hill, about 76 percent of WRSP-induced population not assigned to the campsite is expected to

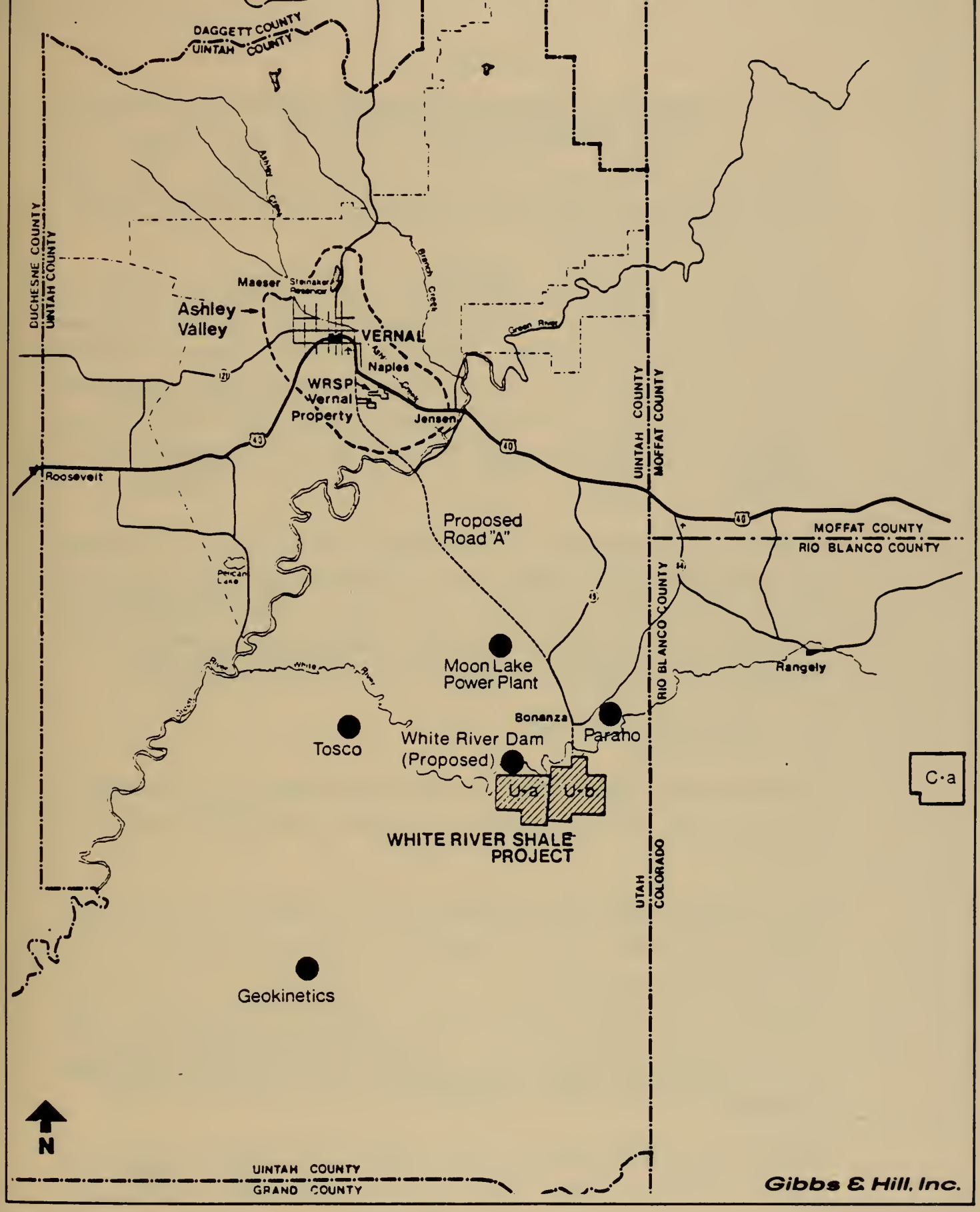

Figure 1.1 White River Shale Project Impact Region

reside in Uintah County, with the remainder commuting from the Rangely area. Of the Uintah County residents, all those not assigned to the campsite are assumed to be residing in the Ashley Valley. These population allocation estimates may change depending upon services available in the different localities.

The relative attraction of the Ashley Valley and Rangely to WRSP construction and operating staff was estimated, based on ease of access and the relative size of each settlement. A gravity model was applied to aid in the analysis. As a result of this analysis, the Ashley Valley was allotted 75.1 to 81.1 percent of the growth and Rangely was allocated 18.9 to 24.9 percent over the period of construction and operation.

Of all the planned energy-related projects in the region, it is assumed that 20 percent of their populations will commute outside Uintah County, and that an additional 10 percent will remain in Uintah County but will reside outside the Ashley Valley; thus, approximately 70 percent of the new population is expected to settle in the Ashley Valley.

1.3 EMPLOYMENT PROJECTIONS

White River Shale Project's direct employment impact on this region will consist of two distinct categories of workers, construction workers and operation workers.

Since the WRSP construction workforce will be temporary in nature, the majority of workers will be housed in a construction camp on site. The WRSP operation workforce will be more permanent in nature and is expected to be assimilated into the existing communities over time. This direct WRSP employment will generate opportunities for an additional workforce (indirect workers) to service the needs of the expanded community.

Table 1.1-1 details WRSP direct employment and the resulting population. Table 1.1-2 details WRSP's total impacts on employment and population.

TABLE 1.1-1

WRSP DIRECT EMPLOYMENT AND POPULATION -
1985, 1989, AND 1994

	Phase I Modular 1985	Phase II Commercial 1989	Phase III Commercial 1994
DIRECT EMPLOYMENT[1]			
Construction	346	3,797	0
Operations	369	1,286	3,350
Subtotal	715	5,083	3,350
DIRECT POPULATION			
Construction-related[2]	779	8,543	0
Operations-related[3]	989	3,446	8,978
Subtotal	1,768	11,989	8,978

---

1. Source is WRSP; see Table D-1.
2. Ratio of 2.25 persons per employee; see Table D-2, line 5.
3. Ratio of 2.68 persons per employee; see Table D-3, line 7.

Source: Gibbs & Hill, Inc.

TABLE 1.1-2

WRSP DIRECT AND SECONDARY EMPLOYMENT AND POPULATION - 1985, 1989, AND 1994

	1985	1989	1994
CONSTRUCTION EMPLOYMENT	519	7,214	0
OPERATION EMPLOYMENT	590	2,572	8,375
TOTAL EMPLOYMENT[1]	1,109	9,786	8,375
TOTAL POPULATION[2]	2,065	18,132	15,935

---

1. Total employment is defined as direct plus secondary employment; source is Table D-1.
2. Total population is derived in Table D-4 (line 7): due to two-wage-earner households, the ratio of total population to workers is about 1.9.

Source: Gibbs & Hill, Inc.

2.0 ECONOMIC ENVIRONMENT

The regional impact area has been defined to include Uintah County, Utah, and Rio Blanco County, Colorado. In this section of the report, the economy of the counties, their labor force, and the income levels of county residents are described in terms of the recent past and likely future levels. Uintah County, as the anticipated major area of WRSP impacts, is described in detail.

2.1 UINTAH COUNTY ECONOMY

The Economy of Uintah County is primarily described in terms of employment by industry. Recent trends are described in general terms with the current economy described in detail.

Future growth has been projected over two assumptions: (1) the minimum growth assumption that no energy-related projects are implemented and (2) the maximum growth assumption that all six major energy projects are built as planned. The minimum growth projection serves as a baseline against which to assess the potential impact of the WRSP.

2.1.1 Recent Trends

The economy of Uintah County is growing at a rapid rate. Starting from 4,163 jobs in 1970, the economy grew at an average rate of 538 jobs each year, to reach 9,009 jobs in 1979. The average annual employment growth rate in Uintah County was about 8 percent.

As of 1979, the basic mining and agriculture sectors had the most workers, over 1,500 each; trade, services, and government, which are largely local service activities, had between 1,300 and 1,500 workers each. Manufacturing was not an important part of the local economy, with only 344 workers. Construction also played only a minor part in the regional economy. (See Table 2.1-1.)

Mining, including oil and gas exploration, and agriculture are the basic industries of the region. They bring cash into the region and generate additional economic activity. The growth in oil and gas exploration generated most of the growth in non-basic industries, such as trade and services.[1]

2.1.2 Future Growth

According to State economic planners, the extent of future growth is uncertain.[2] It can best be described as being somewhere between low growth that would occur if no energy projects are built and the very high growth that would occur if all six of the energy projects are built as scheduled.

A low-growth projection has been prepared for the Uintah Basin, a tri-county area of which Uintah County is a major part. The projection assumed no growth in mining and manufacturing and a decline in agriculture, offset by employment increases in the service sectors of the economy, for an overall employment increase of 13.7 percent between 1980 and 1994.[3] This projection has been applied to Uintah County, using the reasonable assumption that the County will share the regional growth in direct proportion to its current share of regional population. Under this assumption, Uintah County employment is projected to grow from 9,000 in 1980 to 10,300 by 1994. As Table 2.1-2 indicates, the average annual increase in this period would be about 1.0 percent, a considerable levelling compared to the growth in the 1970's. (For detailed projections and methodology, see Appendix C, Table C-7.)

With the high-growth projection, if all six energy-related projects go forward as planned, they would add up to 6,870 direct construction jobs and about 5,700 direct permanent jobs within the regional economy. Since these are direct jobs that bring cash into the economy from outside, each such job would generate additional indirect local jobs.

Given the multiplier effect of these direct jobs on the economy, a peak employment increment of almost 20,000 permanent and temporary jobs would be generated in 1989, levelling off to 14,450 jobs by the year 1994. WRSP would account for over half the direct operational employment of all energy projects and therefore would generate over half the overall employment resulting from all energy projects. (See Tables 2.1-3 and 2.1-4.) The development of the phosphate industry, however, has not been included in these growth projections. It is expected that the phosphate industry will have substantial impact on the area's growth.

2.2 UINTAH COUNTY LABOR FORCE CHARACTERISTICS

The labor force of an area is dependent on many factors, the most influential of which is the extent and composition of the area's economy. In 1979, the Uintah County labor force included 8,554 people, and the regional economy generated 9,009 jobs, as described earlier. Although most of these jobs were held by county residents, some residents did work outside the County, while others, who were employed in the County, resided outside. About 8,230 residents of Uintah County were employed in 1979 with an estimated 324 members of the labor force unemployed. The unemployment rate in 1979 was 3.8 percent, somewhat less than the state average of 4.5 percent. (See Table 2.2-1.)

The Uintah County workforce reflects the agricultural and mining base of the economy. For example, in 1970, 6.6 percent of the workforce were farmers and managers compared to 1.8 percent of all workers in the state; and 20.1 percent were truck drivers and other operatives, compared to 13.4 percent of all state workers. (See Table 2.1-1.)

Female participation rates can be a major factor in the ability of a region's population to meet and take advantage of the needs of growth. Uintah County has a growing rate of female participation in the labor force but it lags behind state trends. Specifically, in 1970, only 33

percent of adult women were in the County labor force, which was 8 percentage points less than the state. By 1980, Uintah County's rate increased to over 40 percent, while the state reached 49 percent. (See Table 2.2-3.)

2.3 UINTAH COUNTY INCOME LEVELS AND DISTRIBUTION

Income data are usually expressed in terms of total personal income and median family income. Total personal income data for a region is disaggregated by source, such as wages and salaries, and by industrial classification. It serves to describe the local wage economy and non-wage sources of income, such as transfer payments, and is useful to indicate economic trends over time. Median family income, or related measures such as median household income and per capita income, is a good indicator of the well-being of the population in a region, especially compared to state or national levels.

Total personal income in Uintah County in 1974 was $56.6 million. In 1979, personal income was about $114.6 million. Total personal income doubled in that five-year period. The mining sector accounted for 31 percent of all wage and salary disbursements in the County. (See Table 2.3-1.)

Median family income in Uintah County in 1979 was $18,000, which was about 8 percent below the state level. In 1970, median family income was about 87 percent of the median for the state. By 1975, the ratio had risen to 92 percent. The gap between state and county median family income levels has been narrowing in recent years and that trend will probably continue into the future. (See Table 2.3-2.)

2.4 RIO BLANCO COUNTY ECONOMY

Rio Blanco County had 2,282 full- and part-time employees in 1974. By 1979, employment grew to 3,477, an increase of 52 percent in five years. (See Table 2.4-1.)

Total personal income in 1979 was $55.5 million, a substantial increase over the 1974 total of $18.3 million. Mining, construction, services and public sector wage and salary incomes doubled in that five-year period. (See Table 2.4-2.)

The substantial employment growth in Rio Blanco County is due to growth in the mining sector. Employment within the mining sector grew from 340 in 1974 to 1,166 in 1979, an increase of 243 percent. Mining wages in 1979 were $31.8 million, over half the total personal income in the county. (See Tables 2.4-1 and 2.4-2.)

The labor force grew from 1,983 in 1970 to 2,357 in 1978. The labor force in 1979 included 2,600 persons, almost all of whom were employed. The unemployment rate was 1.8 percent in 1979.[4] (See Table 2.4-3.)

In 1970 and 1975 Rio Blanco County families had 15-16 percent lower median incomes than families of the state of Colorado. (See Table 2.4-4.)

TABLE 2.1-1

UINTAH COUNTY EMPLOYMENT BY SECTOR,
1970, 1975 AND 1979

Employment Sector	1970[2] Persons Employed	1970[2] Percent of Total	1975 Persons Employed	1975 Percent of Total	1979[3] Persons Employed	1979[3] Percent of Total
MINING	715	17.2	1136	16.3	1672	18.6
CONTRACT CONSTRUCTION	270	6.5	296	4.3	493	5.5
MANUFACTURING	243	5.8	287	4.1	344	3.8
TRANS., COMM. AND UTILITIES	230	5.5	496	7.1	531	5.9
TRADE	966	23.2	1370	19.7	1499	16.6
FINANCE, INSURANCE, REAL EST.	100	2.5	123	1.8	133	1.5
SERVICE	803	19.3	1041	15.0	1483	16.5
GOVERNMENT[1]	340	8.2	1023	14.7	1333	14.8
TOTAL NON-FARM	3667	88.1	4772	83.0	7488	83.2
AGRICULTURE	496	11.9	1184	17.0	1521	16.8
TOTAL EMPLOYMENT	4163	100.0	6956	100.0	9009	100.0

---

1. Includes school districts.
2. From computer tapes provided by the Regional Economics Information System, Bureau of Economic Analysis, US Department of Commerce, 1974; as found in Baseline Description of Socio-Economic Conditions in the Uintah Basin, Western Environmental Assn., Inc., June, 1975.
3. Department of Employment Security, 1970 Census Data; as found in Uintah Basin Oil Shale Impact Study. Interim Report, Uintah Basin Assn. of Governments and APA Planning and Research, July 1980.

Source: Gibbs & Hill, Inc.

TABLE 2.1-2

BASELINE POPULATION AND EMPLOYMENT PROJECTIONS
FOR UINTAH COUNTY -
1980 AND 1994[1]

	1980[2]	1994
3-COUNTY REGION POPULATION	33,915	38,560[3]
UINTAH COUNTY POPULATION (60.5%)	20,247	23,367
EMPLOYED LABOR FORCE (41.4%)	8,377	9,668
EMPLOYMENT (add 632)[4]	9,009	10,300

---

1. For detailed projections see Appendix C and Table C-6.
2. US Census and Utah Department of Employment Security.
3. Utah Office of State Planning Coordinator.
4. Assume differential between employment and employed labor force, 632 in 1980, is unchanged in 1994. This is a Gibbs & Hill assumption.

Source: Gibbs & Hill, Inc.

TABLE 2.1-3

MAJOR AREA PROJECTS IN UINTAH COUNTY, 1980

	Long-Term Operation Employment
OIL SHALE MINING AND PROCESSING	
White River Shale	3353
Paraho Oil Shale	520
Tosco Sand Wash	1260
Geokinetics Oil Shale	500
Subtotal	5633
OTHER PROJECTS	
Moon Lake (Coal-fire steam electric generating facility)	80
White River Dam Reservoir and Hydroelectric Power	10
Subtotal	90
TOTAL	5723

Source: Gibbs & Hill, Inc. Estimates based on information available as of April, 1981.

TABLE 2.1-4

REGIONAL EMPLOYMENT GENERATED BY AREA PROJECTS*-
1985, 1989, 1990, AND 1994

	1985	1989	1990	1994
WRSP (DIRECT & INDIRECT)	1109	9786	9503	8375
OTHER AREA PROJECTS	4494	9983	8903	6075
TOTAL	5603	19769	18406	14450
WRSP PERCENTAGE SHARE	19.8	49.5	51.6	58.0

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* For derivation, see Table C-1 in Appendix C

Source: Gibbs & Hill, Inc.

TABLE 2.2-1

UINTAH COUNTY EMPLOYMENT AND LABOR FORCE, 1979

	Persons	Percent
EMPLOYMENT[1]	9009	
LABOR FORCE[2]	8554	100.0
Unemployed	324	3.8
Employed	8230	96.2

---

1. Employment refers to jobs held within the county. The labor force that holds these jobs may or may not reside in the same county.
2. Labor force refers to adults who are employed or seeking employment, and reside in the county. The jobs held by employed workers may or may not be located in the same county.

Source: Utah Department of Employment Security

TABLE 2.2-2

UTAH AND UINTAH COUNTY LABOR FORCE CHARACTERISTICS - 1970 AND 1980

	Utah State		Uintah County	
	1970 [1]	1980 [2]	1970 [1]	1980 [2]
TOTAL NUMBER OF PERSONS 16 AND OLDER	681,326	992,024	7,683	13,300
TOTAL NUMBER OF PERSONS IN LABOR FORCE	403,634	621,000	4,383	8,000
PERCENT OF TOTAL	59.2	62.6	57.0	60.2
MALES 16 AND OLDER	330,157	490,000	3,843	6,700
IN LABOR FORCE	257,835	375,000	3,118	5,300
PERCENT OF TOTAL	78.1	76.5	81.1	79.1
FEMALES 16 AND OLDER	351,169	502,000	3,840	6,600
IN LABOR FORCE	145,799	246,000	1,265	2,700
PERCENT OF TOTAL	41.5	49.0	32.9	40.9

---

1. Western Environmental Association, Inc., June 1975.
2. Utah Department of Employment Security, June 1981.

Source: Gibbs & Hill, Inc.

TABLE 2.3-1

PERSONAL INCOME BY MAJOR SOURCES IN UINTAH COUNTY - 1974, 1975 AND 1979

Total Labor and Proprietors Income by Place of Work[3]	1974[1]	1975[2]	1979[2]	% Total Earnings	% Increase 1979-1974
BY TYPE					
Wage and Salary Disbursements	46,414	52,469	95,579		106
Other Labor Income	3,191	3,972	7,895		147
Proprietors Income[4]	7,019	4,574	11,123		58
Farm	1,051	257	1,008		-4
Non-Farm[4]	5,968	4,317	10,114		69
BY INDUSTRY					
Farm	1,529	813	1,710	1.49	12
Non-Farm	55,095	60,202	112,887	98.51	105
Private	47,720	51,726	97,963	85.48	105
Agric.Service, Forestry, Fish, Other[5]	(L)	(0)	111	.10	(0)
Mining	16,136	16,003	35,627	1.09	121
Construction	3,915	4,189	11,079	9.67	183
Manufacturing	2,532	2,073	2,845	2.48	12
Non-Durable Goods	1,022	541	872	-76	-15
Durable Goods	1,510	1,532	1,973	1.72	31
Transportation and Public Utilities	4,909	6,578	10,431	9.10	112
Wholesale Trade	5,321	4,796	5,540	4.83	4
Retail Trade	5,296	5,963	10,289	8.98	94
Finance, Insurance, Real Estate	938	(0)	2,070	1.81	121
Services	8,667	11,102	19,971	17.43	130
Government and Government Enterprises	7,375	8,476	14,924	13.02	102
Federal, Civilian	2,530	2,692	4,959	4.33	96
Federal, Military	226	234	335	.29	48
State, Local	4,619	5,550	9,630	8.40	108
DERIVATION OF PERSONAL INCOME BY PLACE OF RESIDENCE					
Total Labor and Proprietors Income by Place of Work	56,624	61,015	114,597	100.00	102
Less: Personal Contributions for Social Insurance by Place of Work	3,088	3,426	6,475		110
Net Labor and Proprietors Income by Place of Work	53,536	57,589	108,122		102
Plus: Residence Adjustment	3,567	3,124	3,041		
Net Labor and Proprietors Income by Place of Residence	57,103	60,713	111,163		95
Plus: Dividends, Interest, Rent[6]	6,548	8,102	12,130		85
Plus: Transfer Payments	5,807	7,629	10,644		83
Personal Income by Place of Residence	69,458	76,444	133,937		93
Per Capita Personal Income (Dollars)	4,273	4,375	6,630		
Total Population (Thousands)	16.3	17.5	20.2		

---

1. Estimates based on Standard Industrial Classification System of 1967.
2. Estimates based on Standard Industrial Classification System of 1972.
3. Consists of wage and salary disbursements, other labor income, and proprietors income. primary source for non-farm wages: ES-202 covered wages, Utah Department of Employment Security.
4. Includes the capital consumption adjustment for non-farm proprietors.
5. Includes wages and salaries of US residents working for international organizations in the United States.
6. Includes the capital consumption adjustment for rental income of persons.

(0) Not shown to avoid disclosure of confidential information. Data are included in totals.
(L) Less than $50,000. Data are included in totals.

Sources: Regional Economics Information System
Bureau of Economic Analysis, April 1981

TABLE 2.3-2

MEDIAN FAMILY INCOME
FOR UINTAH COUNTY AND THE STATE OF UTAH -
1970, 1975, AND 1979

	1970[1]	1975[1]	1979[2]
STATE OF UTAH	$ 9320	$ 14329	$ 19500
UINTAH COUNTY	8082	13152	18000
County, as Percent of State	87	92	92

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1. Uintah Basin Oil Shale Impact Study; Interim Report; Uintah Basin Association of Governments and APA Planning and Research, July 1980.
2. Utah Department of Employment Security, June 1981

Source: Gibbs & Hill, Inc.

TABLE 2.4-1

FULL- AND PART-TIME EMPLOYMENT BY TYPE AND BROAD INDUSTRIAL CLASSIFICATION IN RIO BLANCO COUNTY, COLORADO - 1974, 1978, AND 1979

Employment by Place of Work	1974[1]	1978[2]	1979[2]	Percent Increas 1979-1974
TOTAL EMPLOYMENT[3]	2,282	2,857	3,477	52
Number of Proprietors	506	515	527	4
Farm Proprietors	208	193	190	-9
Non-Farm Proprietors	298	322	337	13
TOTAL WAGE AND SALARY EMPLOYMENT	1,776	2,342	2,950	66
Farm	109	114	92	-16
Non Farm	1,667	2,228	2,358	71
Private	1,036	1,533	2,150	108
Agric.Service, Forestry, Fish, Other[4]	(L)	10	10	(D)
Mining	340	619	1,166	243
Construction	126	174	133	45
Manufacturing	33	34	29	-12
Non-Durable Goods	(L)	(L)	(L)	(D)
Durable Goods	29	27	20	-31
Transportation and Public Utilities	109	171	197	81
Wholesale Trade	13	36	31	138
Retail Trade	210	293	308	47
Finance, Insurance, Real Estate	42	52	55	31
Services	158	144	171	3
Government and Government Enterprises	631	695	703	12
Federal, Civilian	40	40	33	-17
Federal, Military	22	16	16	-27
State, Local	569	639	659	16

---

1. Estimates based on Standard Industrial Classification System of 1967.
2. Estimates based on Standard Industrial Classification System of 1972.
3. Consists of wage and salary jobs plus number of proprietors.
4. Includes number of jobs held by US residents working for international organizations in the US. Primary source for private non-form employment: ES-202 covered wages, Colorado Division of Employment.
   (D): Not shown to avoid disclosure of confidential data. Data included in totals.
   (L): Less than 10 wage and salary jobs.

Source: Regional Economic Information System
Bureau of Economic Analysis, US Department of Commerce, April 1981.

TABLE 2.4-2

PERSONAL INCOME BY MAJOR SOURCES IN RIO BLANCO COUNTY, COLORADO - 1974, 1978 AND 1979

Total Labor and Proprietors Income by Place of Work[3]	Thousands of Dollars 1974[1]	1978[2]	1979[2]	Percent Increase 1974-1979
BY TYPE				
Wage and Salary Disbursements	13,117	26,541	44,084	236
Other Labor Income	905	2,573	5,538	517
Proprietors Income[4]	4,267	8,288	5,820	36
Farm	499	3,991	1,102	121
Non-Farm[4]	3,768	4,297	4,718	25
BY INDUSTRY				
Farm	1,074	4,757	1,821	70
Non-Farm	17,215	32,645	53,671	212
Private	13,124	26,605	47,096	259
Agric.Service, Forestry, Fish, Other[5]	(L)	53	60	(D)
Mining	6,258	13,031	31,819	408
Construction	1,588	3,814	4,169	163
Manufacturing	389	588	594	53
Non-Durable Goods	(L)	95	124	(D)
Durable Goods	343	493	470	37
Transportation and Public Utilities	1,469	3,296	3,720	153
Wholesale Trade	231	626	631	173
Retail Trade	1,474	2,082	2,391	62
Finance, Insurance, Real Estate	545	1,073	1,210	122
Government and Government Enterprises	4,091	6,040	6,575	61
Federal, Civilian	588	706	628	7
Federal, Military	(L)	(L)	(L)	(D)
State, Local	3,467	5,293	5,905	70
DERIVATION OF PERSONAL INCOME BY PLACE OF RESIDENCE				
Total Labor and Proprietors Income by Place of Work	18,289	37,402	55,492	203
Less: Personal Contributions for Social Insurance by Place of Work	919	1,746	1,999	118
Net Labor and Proprietors Income by Place of Work	17,370	35,656	53,493	208
Plus: Residence Adjustment	-73	9	-9,894	
Net Labor and Proprietors Income by Place of Residence	17,297	35,665	43,599	152
Plus: Dividends, Interest, Rent[6]	3,586	6,138	7,180	100
Plus: Transfer Payments	2,340	3,634	4,028	72
Personal Income by Place of Residence	23,223	45,437	54,807	136
Per Capita Personal Income (Dollars)	4,478	8,140	8,754	
Total Population (Thousands)	5.2	5.6	6.3	

1. Estimates based on Standard Industrial Classification System of 1967.
2. Estimates based on Standard Industrial Classification System of 1972.
3. Consists of wage and salary disbursements, other labor income, and proprietors income. Primary source for private non-farm wages: ES-202 covered wages, Colorado Division of Employment.
4. Includes the capital consumption and adjustment for non-farm proprietors.
5. Includes wages and salaries of US residents working for international organizations in the United States.
6. Includes the capital consumption adjustment for rental income of persons (L) less than $50,000. Data are included in totals.

Source: Regional Economics Information System, Bureau of Economic Analysis, April 1981

TABLE 2.4-3

RIO BLANCO COUNTY AND STATE OF COLORADO LABOR FORCE - 1970, 1978, AND 1979

	1970[1]	1978[2]	1979[2]	Percent Change
RIO BLANCO COUNTY	1,988	2,357	2,600	30.8
STATE OF COLORADO	910,653	1,246,204	1,370,000	50.4

---

1. US Department of Commerce, Bureau of the Census, County and City Data Book, 1972.
2. Colorado Department of Labor and Employment, 1979.

Source: Gibbs & Hill, Inc.

TABLE 2.4-4

RIO BLANCO COUNTY AND COLORADO
MEDIAN FAMILY INCOME,
1970 and 1975

	1970[1]	1975
STATE OF COLORADO	9,552	12,990[3]
RIO BLANCO COUNTY	8,007	11,054[2]
County, as Percent of State	83.8	85.5

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1. US Department of Commerce, Bureau of the Census, General Social and Economic Characteristics, 1970.
2. Colorado Department of Health, 1976.
3. US Department of Commerce, Bureau of the Census, County and City Data Book, 1977.

Source: Gibbs & Hill, Inc.

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2. Ibid., and Uintah Basic Area Governments, interim report, June, 1981.

3. State Planning Coordinator, Energy: 2000; The Impacts of Energy Development in Eastern Utah, November, 1980, page 9.

4. Colorado Department of Labor and Employment, Colorado Manpower Review, May, 1979.

3.0 EXISTING COMMUNITY INFRASTRUCTURE AND RESOURCES

This section describes the physical and service resources--land, community facilities and services, and infrastructure systems--either existing now in the Ashley Valley and in Rangely, or planned for the near future. This is the baseline against which future projected demands for these resources, due to WRSP and other area projects, are measured. (See Sections 7.3 and 7.4.)

3.1 ASHLEY VALLEY, UTAH

The Ashley Valley, located in north-central Uintah County, Utah, encompasses the city of Vernal, the populated centers of Maeser, Jensen, and Naples, and scattered and expanding residential growth in an otherwise agricultural area.

The Ashley Valley is geographically a sharply defined area, bounded by arid hills on the north, east, and west, and by the Green River on the south. Primary land of the Valley, within the urbanized areas surrounding Vernal and Maeser, are agricultural and grazing land, and arid rangeland. Topography consists generally of flat to gently rolling plateaus or basins with occasional low, rugged ridges and shallow gulches.

The Valley is approximately 16 miles in length, 8 miles in width, and occupies about 150 square miles (96,000 acres). The official 1980 population is 16,168 with 6,600 in Vernal city.

Considered in this baseline discussion of the Ashley Valley are the availability and suitability of land, housing, water and sewer services; other utilities including solid waste collection and disposal; and selected critical support facilities including schools, law enforcement, fire protection, medical facilities and services, and social services.

3.1.1 Availability of Developable Land

Approximately 24,000 acres in the Ashley Valley are suitable for residential development. These acres consist of land accessible to existing or planned utilities, and not precluded from development by physical constraints.[4]

Because of constraints imposed by the existing water and wastewater treatment facilities, only 530 building lots and 83 vacant mobile home spaces are currently available for development in the Ashley Valley.[4]

The number of available lots will increase substantially when planned new wastewater and water treatment facilities and network expansions are completed. Construction is nearing completion on the first phase of the new wastewater treatment system; new water treatment facilities should be on line by 1985 and distribution lines will be extended as needed.

3.1.2 Availability of Housing

The vacancy rate for Ashley Valley housing is zero percent. The Vernal Chamber of Commerce maintains the only housing vacancy listing service in the Valley, and presently lists one mobile home and one duplex housing unit as vacant.[35]

Vernal presently has 1,572 single-family dwellings, 348 mobile homes, and 486 multi-family housing units. Individual community statistics for Jensen, Naples, and Maeser have not yet been released; however, the combined total number of housing units in these three communities is 2,918 single-family units, with no mobile homes or multi-family dwellings. The greatest number of single-family units in these three communities are located in Maeser.[35]

Housing quality information is available only in limited amount. The following is a summary of housing quality in Vernal City, and Ashley Valley.[4]

	Sound	Deteriorated	Dilapidated
Vernal City	87%	12%	1%
Ashley Valley	94%	--	6%

Average home sale value in Uintah County for 1979 was $45,000.00; for 1980, it was $48,000.00.[4]

3.1.3 Water

Four separate local government entities are responsible for water supply and sewage collection and treatment in the Ashley Valley. They are Vernal City, the Ashley Valley Water and Sewer Improvement District, the Jensen Water Improvement District, and the Maeser Water Improvement District.

The water supply itself, located at Ashley Springs, is owned by irrigation companies, established during the initial settlement of the Valley, for which certificates of stock have been issued. The Valley farmers own approximately 95 percent of these certificates, while the remaining water rights are owned by Vernal City. Water is sold to the other three water jurisdictions and distributed to their territories. The supply is metered at the point of entry into the particular jurisdiction.[14]

An on-going disagreement between Vernal City and Ashley Valley Water and Sewer Improvement District, regarding the ownership and control of water distribution within the Ashley Valley jurisdiction, is nearing resolution. Vernal City, as of July 1, 1981, will be responsible for the distribution of water and collection and treatment of sewage within

Vernal City limits only. Ashley Valley Sewer and Waste Improvement District will be responsible for the distribution of water in those unincorporated areas of Uintah County not presently covered by the Jensen and Maeser systems. In addition, it will also be responsible for the sewer system in all of the unincorporated areas of Uintah County except for the Jensen Area.

3.1.3.1 Supply and Distribution

All metered water now used in the Ashley Valley originates at Ashley Springs, approximately 10 miles northwest of Vernal.

Supply and distribution has been adequate to serve the Valley's needs until recently. The Vernal water supply system is a metered system with a storage capacity of 2.5 million gallons per day. The system has a design population of about 20,100 persons. However, due to pipe leakage and water taken for unmetered uses, the metered capacity is actually about 4.5 million gallons per day, with an effective capacity population of 10,400. Since the service area has a population of about 16,000, the need for improvements to the water distribution system is obvious.[5] (Table 3.1-1.)

Present water treatment capabilities consist of only chlorination, with no sand filtration. Furthermore, the Ashley Springs water exhibits high turbidity during the spring months. As such, the Environmental Protection Agency (EPA) and the Utah State Board of Health require a new water treatment plant to be built.[4,14]

3.1.3.2 Specific Problems

A water allocation agreement exists between Vernal City and the Maeser district which allocates 7/8 of the Ashley Springs supply line to Vernal and 1/8 to Maeser. The Ashley Valley District has an agreement with Maeser whereby Ashley Valley can use a portion of Maeser's allocation.

The Maeser and Ashley Valley Districts currently use more water than the 1/8 allocation of Ashley Springs which belongs to Maeser and actually uses portions of Vernal's 7/8 allocation. However, whenever Vernal City needs to use its full 7/8 allocation, Vernal City has the right to claim its full allocation of water.[14]

A problem of inadequate distribution also exists in Jensen, which purchases its water from Vernal. The only connection is through a 6-inch diameter line from Vernal and this line is presently over-utilized. Recently, portions of the Jensen district have been without water due to the over-utilization and inadequacies in the distribution system.[14]

Finally, much of the distribution network outside Vernal City is over 20 years old, and in a state of disrepair, with frequent breaks and leaks.[14]

All of this indicates a need for the four districts to upgrade and increase the capacity of the distribution network, and to construct new treatment facilities.

3.1.3.3 Future System

To redress the present deficiencies and provide for anticipated future demand, several improvements in supply, treatment and distribution are planned. Vernal has contracted with the Uintah Basin Conservancy District to purchase water through the Departrment of Interior from the Central Utah Water Project. Through this project, Vernal will be allocated 8,000 acre-feet of water from Red Fleet Reservoir. This new reservoir, now being filled (capacity 42 cfs), is about seven miles northeast of Vernal.[24]

Vernal's plan of action calls for the use of Red Fleet Reservoir during the spring (the period of high turbidity of the Ashley Springs) and for the use of Ashley Springs during the balance of the year. The source

capacity of the total planned water system, including the capacity of the existing system, will be increased to 20,000 connections through the use of Red Fleet water.

To meet the EPA and Utah Board of Health requirements, Vernal will need to construct its own water treatment plant near the corner of 2500 West and 2500 North to treat water which would be supplied from the Red Fleet Reservoir. An aquaduct from Red Fleet to this plant will be needed. Vernal City is also considering constructing a series of small reservoirs above the treatment plant for additional supplies.

The Ashley Valley District has completed a pilot plant study at Ashley Springs to determine the best treatment process for the supply. A new 10-15 MGD water treatment plant will be located at Ashley Springs, but the final size is uncertain because Vernal City may decide not to use Ashley Springs for its supply of water.[14]

Several projects to expand and improve the distribution system are currently under construction or consideration. The Ashley Valley District is constructing a 20-inch diameter pipeline (which reduces to 12-inch diameter) that will connect an existing 2.0 MG storage tank near the 500 South-3500 West intersection with an existing 0.25 MG storage tank located near the 4000 South and 500 West intersection in Davis, approximately parallel to the Highline Canal. Completion of this line is expected in fall, 1981. This project will increase the available flow to the Davis area by 60 percent.[11] (Figure 7-1.) Ashley Valley District also plans to begin construction of a 2.0 MG storage tank in this area by the end of 1981. Both of these improvements should help alleviate an existing problem of inadequate water pressure in the southern and higher portions of the service area.

3.1.3.4 Financing of Improvements

The Ashley Valley District is short of funds to reconstruct or expand its water distribution networks. Furthermore, the funds needed to build the Ashley Valley District's treatment plant may not be available. No time schedule or plan exists for which areas within the districts will be developed first. Expansion of the distribution networks will occur as needed.[11,14]

Vernal City will be able to build its own water treatment plant, a series of reservoirs and additional distribution network, with its present revenues from existing water rights.[14]

3.1.4 Wastewater Treatment System

The City of Vernal has a wastewater collection and treatment system that serves only the city proper. Areas outside the city limit are not now sewered. The system consists of a trickling filter-type treatment facility with a 1.0 MGD capacity and a design population of 7,500 persons. At present the average flow is 1.5 MGD and Vernal's 1980 population is 6,600.[19] (Table 3.1-2.) The collection network has been extended gradually over the past several years as the city expanded. But it is now overloaded, due to population increases and groundwater infiltration. The existing sewerage treatment plant was built in 1957 and is suffering from continuing breakdowns of equipment.[1,19]

The State Department of Health has recommended that a valley-wide sewer system be constructed in the Ashley Valley.[1] Such a system has been designed and approved by the Ashley Valley Sewer Management Board. (See Figure 7-1.) The new system consists of collection and disposal facilities. Construction has begun on a wastewater disposal plant and on a containment lagoon disposal system; these, as well as the main trunk sewers to the plant, should be finished by the end of 1981.[19]

As part of the Master Plan for the Ashley Valley area, sewers have been proposed for the entire area. Approximately 65 percent of the new sewers, consisting of those north of the main trunk line, are either completed or under construction. The remaining 35 percent of the system, south of the main trunk, has been designed. Funds for construction have run out due to the EPA cutbacks. No additional construction will occur until EPA reinstates funding.[14,24] The EPA was financing 75 percent of the project; the remainder of the financing was to come from taxes and bonding.[11] Upon completion, the new system would have an average design flow rating of 9.8 MGD, a peak capacity of 21.5 MGD at the plant, and a design population of 40,000 persons.[8]

Use of this anticipated valley-wide sewer system probably would approach the system's design population of 40,000 persons by 1990, when, according to Gibbs & Hill estimates, the Ashley Valley population will peak at nearly 40,500 persons. However, the population is expected to decline to just under 35,000 by 1994 (Table 5.1-8). Therefore, it appears that the anticipated system could accommodate the expected growth from in-coming area projects.

The Valley is considered to have substantial physical potential to absorb new growth due to the atypical, extensive distribution of infrastructure (roads, water and, to a lesser extent, sewer). It is probable that most new growth in the Valley will occur in areas served by the upgraded water and sewer systems. Growth patterns basically will be in-fill and intensification of development within the dispersed utility service grid.

3.1.5 Solid Waste Collection

Vernal City has one rear loader collection truck operated by a two-man crew, serving non-commercial uses within the Vernal City limits. Collection services are provided once a week to each pick-up point.

The two-man crew has an eight-hour collection schedule on Monday, Wednesday, and Friday, and a 4-1/2 hour schedule on Tuesday and Thursday of each week.[19]

At present, the service level, in terms of collection vehicles and crew, is adequate. The crew can collect from all pick-up points in about 33 hours of a 40-hour week. The estimated time required per pick-up point is one minute. The Vernal Department of Public Works estimates that an additional truck and crew will be needed when the city population reaches 8,000 persons.[19]

3.1.6 Solid Waste Disposal

Uintah County and Vernal City jointly operate a 100-acre sanitary landfill on Bureau of Land Management (BLM) land, along 5th North Street, approximately 3 miles east of Vernal. The landfill has now been filled to about 25 percent of its capacity.[1] Equipment at the landfill consists of one "caterpillar" type vehicle and one trash compactor. The Vernal City collection crew makes about eleven trips per week to the site.

3.1.7 Natural Gas

Natural gas is supplied by the Utah Gas Service only to the immediate area in and around Vernal. Outside that area, propane, electricity, or other forms of energy are used. Within Vernal, 80 percent of all households are served by natural gas.[22] The Northwest Pipeline Corporation, which operates a compressor station at Brush Creek, provides the main gas supply for the Vernal area from its northwest pipeline. This gas is abundant. Utah Gas Service has the potential capability to provide natural gas service to the entire Valley area, as growth and development justify the cost of extending laterals from the main trunk lines.[4]

3.1.8 Electricity

Electrical power is supplied by the Utah Power and Light Company and the Moon Lake Electric Association, a rural electric cooperative. Utah Power and Light provides electric service to all developments within Vernal and the Ashley Valley area, while Moon Lake Electric Association services the rest of the district. Utah Power and Light will be able to meet the demands for electricity associated with projected development in the Ashley Valley region.[4] In addition, Deseret Generation and Transmission Corporation is constructing the 400-MW Moon Lake Power Plant, scheduled for completion about October, 1984.[1]

3.1.9 Telephone Service

Mountain Bell services all of the Ashley Valley area and Bonanza. Uintah Basin Telephone Company, a local cooperative, services the west side of Uintah County.[13]

3.1.10 Schools

The Uintah County School District has six elementary schools, two junior high schools, one high school, and several portable classrooms. Of these schools, one elementary school and one junior high school are located outside the Ashley Valley. The school district also owns several vacant properties in the Ashley Valley with a land area of 135 acres.

Most of the schools in the Uintah County are utilized above their planned capacity.[15,23] Enrollment for the 1980-81 school year is 5,429 pupils, about 600 pupils over the system capacity of 4,823 pupils. (See Table 3.1-4.)

The Uintah County School District exceeds the state average for teacher/pupil ratio with 1:24.8 as compared to 1:22.8 for the state[1,15,23] ,

but is slightly less than the recommended standard of 1:25. (See Section 7.1.)

Teachers are employed in Ashley Valley schools as presented below. In addition, 21 administrators and two counselors are employed.

School	Teachers Employed	Teacher/Pupil Ratio
Elementary	115	1:28
Secondary	94	1:21
Special Education	10	1:13

During normal growth, about 250 new students per year are added to the enrollment in the Uintah School District. In 1979, every school facility in Ashley Valley exceeded capacity. Construction of Discovery Elementary School in 1980 lessened the burden; however, at present all schools are again at or above capacity.[15] (See Table 3.1-5)

There is an immediate need for an elementary school. Also, assuming only natural population growth, there will be a need for some type of secondary school by 1984 and an additional elementary school by 1985.[1]

Bonding was recently defeated for a proposed middle school, a vocational complex at the Vernal High School, and a small high school in the western part of the County.

On July 9, 1981, the school board will select a plan for a new elementary school with a 600-pupil capacity and a staff of eighteen teachers. Bid specifications will be issued in October 1981, and construction could begin the following winter or in spring 1982. Completion is expected by fall 1983. This school will be located on a vacant parcel in Davis which is owned by the school district.[23]

3.1.11 Law Enforcement

Vernal and its outlying areas are served by the Vernal Police Department, the Uintah County Sheriff's Office, and the Utah Highway Patrol. The Vernal Police Department is staffed with seventeen officers. Six additional officers have been requested for 1981, but approval has not yet been granted. The Department's physical facilities are at maximum capacity, however, and allow no room for housing additional staff.[31]

The Uintah County Sheriff's Office employs fourteen officers, about 50 percent below national standards, and is operating at half strength. Recently, two officers were terminated, and approval for replacements has not been given. Physical facilities for the Sheriff's office are at maximum capacity.[32]

The Utah State Highway Patrol has eight troopers and four supervisors to police Duchesne, Uintah, and Daggett Counties. Five of these troopers (of which three are supervisors) patrol Ashley Valley. Three officers who terminated recently have not been replaced because of budget cut-backs.[33]

The Vernal Police Department, Uintah County Sheriff's Office, and State Highway Patrol jointly utilize a six-cell jail facility located in Uintah County Courthouse in Vernal. The jail was originally designed to house 48 prisoners; however, recent regulatory modifications reduced the number of allowable prisoners to 26 by mandating 100 percent more occupancy space per prisoner. Twelve prisoners are housed in the jail on an average daily basis. During 1980 peak days, an average of seventeen new prisoners were added to the constant average daily number of twelve, for a total of 29 prisoners--three over the allowed maximum.

The three enforcement agencies policing Ashley Valley are involved in a combined campaign to promote a centralized Public Safety Complex in

which all three agencies would be housed. This approach has met with public approval, however funds do not exist to support it.[30-33]

Although staffing in anticipation of projected growth cannot be accomplished, the Vernal Police Chief is heavily involved in planning, and is taking steps to create an organizational structure within the Department that will accommodate rapid staffing when appropriate.[31]

The County Sheriff's Office is unable to increase its staff in anticipation of projected growth because of budget constraints. However, the office monitors the population influx and is making growth plans expected to be implemented through the 1982 budget process.[31]

3.1.12 Fire Protection

Vernal has one fire station manned by 25 volunteers. The station is well equipped, with two 1,250 gpm pumpers, one 750 gpm pumper, one grassfire truck, and two crash trucks which service the airport. Vernal also provides fire protection to Maeser. Jensen has one fire station, staffed by 15 volunteers and equipped with one 750 gpm pumper. It has a combined total of 20 volunteers and is presently equipped with one 750 gpm pumper, with funding approved for a second pumper. No fire protection facilities are located in Naples.[30, 34]

Fire protection ratings for communities have been developed by the American Insurance Association to classify the adequacy of fire defense and building conditions. The fire defenses of the municipalities are graded according to several considerations, including water supply, fire department, fire alarm, fire prevention, building facility and structural conditions. Standards are established for each of these aspects and points of deficiency are assigned and charged for deviations from the standards. The fewer the total deficiency points assigned to

the community, the more adequate is the class rating. Ratings range from 1, the most adequate, to 10, the least adequate.

Vernal has been assigned a class rating of 6 for structures located within 1,000 feet of a fire hydrant, and 9 for all other locations.[30]

3.1.13 Health Care Facilities

Vernal has one hospital and three medical clinics. Uintah County Hospital was dedicated in July 1980, occupies 41,000 s.f. and was constructed at a cost of $3.6 million. This acute-care facility serves all of Uintah County. It has 36 beds and employs ten doctors (two are part-time radiologists based in Salt Lake City), twelve registered nurses, thirteen licensed practical nurses, eighteen nurse's aids, and approximately fifty administrative and support employees.[17]

The hospital has an occupancy rate in the range of 65 to 70 percent. The facility has 36 beds total; this occupancy level means that 9 to 10 beds are unoccupied on the average. Occasionally, the hospital is over-utilized and patients are bedded in hallways.

One of the key determinants of hospital usage is the number of physicians available locally. There are only eight physicians practicing full-time in Uintah County, or a physician/population ratio of one physician per 2,500 persons, well below the state average of one physician per 684 persons. Because of this shortage of physicians in Uintah County, many patients who would otherwise receive hospital care locally must seek treatment elsewhere, particularly along the Wasatch Front.[10] (See Table 3.1-6.)

If additional doctors practiced locally, the occupancy rate of the Uintah County Hospital could approach 100 percent of capacity. A

hospital spokesman expects additional physicians to be brought on staff next year.[10]

Uintah County Hospital offers auxiliary laboratory services, X-ray capabilities, physical and respiratory therapy, and other specialty services usually found only in larger cities. In addition, the hospital has a heliport, used in conjunction with medivac systems in Salt Lake City. The facility was designed with the capacity to expand to 100 beds. In adding on to the hospital, the Utah State Planning Office encourages expansion in 30-bed increments.[17]

Uintah County Hospital was, until recently, owned by the County, but managed by Hospital Corporation of America (HCA). In June 1981, after several months of negotiation, HCA completed purchase of the hospital. Under HCA ownership and management, the hospital now has a larger resource of capital for expansion and for attracting additional physicians to the area.[21] HCA is committed to expanding and improving the facility in anticipation of growth in the Valley and substantial improvements are expected. However, rates are expected to increase without the benefit of County subsidization.[1,7]

Efforts are being made by the hospital administration to recruit additional physicians and specialists. The Hospital Corporation of America has given the hospital administration verbal commitment for an expansion to 100 beds. A total of 75 beds are expected to be on line by 1987.[21]

Uintah County is planning to construct a 60-bed nursing home facility. The project is expected to begin construction in September of 1981 and be complete by the end of 1982. The facility will be owned and managed by the County and will provide limited healthcare to nursing home residents.

3.1.14 Social Services

The Utah Department of Social Services maintains an office in Vernal which provides most of the social services available in Ashley Valley. The following programs are provided to Uintah County residents:

- Assistance Payments Program - Provides financial assistance, food stamps, and medical assistance.

- Mental Health Program - Provides an out-patient service with one full-time mental health specialist. Both a psychiatrist and a psychologist are available on a part-time contractual basis. (The closest in-patient treatment facility is along the Wasatch Front.)

- Alcohol and Drug Counseling - Provides out-patient counseling. The local program employs one counselor. Cases requiring social or medical detoxification are sent to the Wasatch Front.

- Child Welfare Unit - Oversees foster care, adoptions, and cases of child neglect and abuse. The Child Welfare Unit has four employees.

- Battered Spouse Program - Provides counseling to battered victims. One full-time worker is available for counseling. A "safe home" is also available to the battered spouses and their children.

- Detention House Shelter Facility - This facility is currently under construction and will be completed about June 1982. It will provide an emergency shelter for abused children, as well as supplying several secure rooms for the detention of problem children. These cases now have to be transported to Salt Lake City.

Uintah County operates a center for the aging. The center for the aging provides recreation, meals, dances, and a telephone re-assurance service to the elderly.

Vernal City itself does not provide social service programs. However, Vernal is participating in the funding of the Detention Home Facility cited earlier, contributing one-fourth of the cost, with the Uintah County contributing three-fourths of the cost.[16]

A need exists to develop a combination youth/family resource center in the Ashley Valley. Such a facility would serve as a resource clearinghouse as well as providing information on child care, parental guidance, and other aspects of family life.

Also needed are local in-patient programs for mental health and medical, and social alcohol and drug detoxification. Uintah County is already experiencing case load increases in some social services. Mental health caseloads are up 25 percent from last year. Currently, there is a 3- to 4-week waiting period for those requiring a caseworker. Also, a significant increase in child welfare cases is apparent (i.e., as many cases from January to June, 1981 as in all of 1980.)[16]

Table 3.1-7 compares existing service levels in Ashley Valley of several social services with Gibbs & Hills' recommended standards. As shown, the existing service levels for each facility are less than the recommended standard.

3.1.15 Recreation Facilities

The Ashley Valley area is rich in recreational facilities, with numerous lakes, rivers, and parks. Camping areas are located throughout the Valley, and snowmobile and cross-country ski trails are maintained and groomed by the State.

Remember-the-Maine-Park, a 20-acre recreation area, is located in Maeser. The State also operates Steinaker Reservoir, located about 4 miles north of Vernal. Dinosaur National Monument is located near Jensen, and Flaming Gorge, a national recreation area, is located about 40 miles north of Vernal. The High Uintas Primitive Area offers back-packing into splendid mountainous areas.[4,13,35]

As shown on Table 3.1-8, Ashley Valley has facilities for sports and recreation. These include a new indoor swimming pool, a 9-hole golf course, tennis and racquetball courts, a health spa, a country club, a 20-acre softball-baseball complex, modern trap shooting, rifle and pistol ranges, white water rafting, rodeo facilities, and boating on nearby lakes.[4,13,35]

3.1.16 Transportation

The principal highways within the Uintah Basin are US-40 and SR-44. US-40 provides the main connections within the Basin and to the Wasatch Front and Western Colorado. (See Figure 1.1.) SR-44 connecting Vernal and Manila is the main north-south route and the main access to Flaming Gorge Recreational Area. Utah State Road 45 connects Bonanza to US-40, and the new road being built this year will connect Vernal to Bonanza.

In terms of bus service, Vernal is served by Continental Trailways. Two buses go daily to Salt Lake and Denver. There is presently no intra-city bus service.

Uintah County has the only airport in the Uintah Basin District that offers commercial and chartered flights. The runway is paved (45,000 P.S.I. - single wheel, 55,000 P.S.I. - dual wheel) and 6,605 feet in length. The lighting includes medium intensity runway lights and a visual approach slope indicator. The airport is also equipped with a

VOR (very high frequency omni-directional range) navaid--a device or system that provides navigational data to airplanes.

3.1.17 Planning for New Growth

Until recently, planning in the Ashley Valley has been minimal. In the last few years, the need for comprehensive planning has been increasingly recognized.

Among the actions taken recently which reflect the need to plan for the anticipated influx of new jobs and population, the following are notable:

- A revised Zoning Ordinance for Vernal City was adopted in May, 1981.

- Revisions to the Uintah County Zoning Ordinance are also being considered, and an effort is being made to make these consistent with the City regulations.

- The offices of Vernal City and Uintah County Planning have been combined with the aim of developing a Comprehensive Master Plan. This plan is currently in preparation and is scheduled for completion within the year.[4]

- For the Ashley Valley area, comprehensive water supply and sewerage system plans are being developed for a target population of about 40,000 persons.

- Vernal City has adopted a Growth Boundary of approximately 8,000 acres within which annexations will be accepted and urban services will be supplied. (See Section 7, Figure 7.2.) It is the city's

policy to encourage growth within this boundary, and to discourage scattered development outside of it.[3]

- The Uintah County School District has purchased properties in anticipation of new growth.

- There have been efforts aimed at creating a new valleywide, incorporated City. There are, however, many political problems with this concept and its future is uncertain.

All of these steps are aimed at establishing a consistent planning and policy framework to guide and control future growth.

3.2 RANGELY, COLORADO

Rangely, Colorado, is located along the White River in the northwestern part of Colorado, near the Utah border. It is located in the western portion of Rio Blanco County and is about 50 miles east of the Ashley Valley, and about 30 miles northeast of Tracts U-a and U-b.

Rangely had a 1980 population of 2,113 and is located in a sparsely populated area. Beyond the town boundary are thousands of acres of arid undeveloped land, owned principally by the BLM.

Considered in this baseline discussion of Rangely are the availability and suitability of land, housing, utilities, and selected critical support facilities including schools, police and fire protection, and medical facilities and services.

3.2.1 Availability of Developable Land

Rangely has a limited amount of land suitable for development. Virtually all land surrounding the town is owned by the BLM.[3] An extensive floodplain along the White River precludes development in the northern portion of the town.[28]

There are roughly 350 acres of vacant land zoned for residential use. Most of this is zoned for single family use, but there are also duplex, townhouse and apartment zones. The largest tract of undeveloped land within the town is in its east end, surrounding Colorado Northwestern Community College.[29]

Rangely soon will be acquiring approximately 207 acres of BLM land within the town limits, which will be made available for residential development.

Based on an average residential density of 4.7 dwelling units per acre and on existing residential zoning, Rangely could absorb an additional 1,645 housing units.

3.2.2 Available Housing

According to the 1980 census, Rangely had a total of 743 year-round housing units in 1980. Virtually all of these dwellings are occupied.

Rangely has a shortage of adequate, affordable housing; the shortage is particularly acute for moderately priced, conventional single-family houses. Because mortgage rates and construction costs are prohibitively high, mobile homes seem the only affordable housing for many moderate income families.

To encourage additional housing construction, Rio Blanco County is financing a Residential Mortgage Program through the issuance of tax exempt bonds by the county. This program will enable low and moderate income families to obtain capital for housing financing.[3]

3.2.3 Water Supply and Treatment

The Town of Rangely provides the water supply, treatment works, and distribution network only within the boundaries of Rangely. Water is supplied to the system by an intake from the White River located about 2 miles upstream from Rangely.[2] The raw supply is considered unlimited[2] and Rangely has a 30.95-cfs water right on the White River for future expansion.[3] In addition, a new reservoir is being planned about 8-10 miles upstream from Rangely.[18]

A new water treatment plant, the first stage of which was completed in 1978, is located on a 15 acre site north of Highway 64 and upstream from Douglas Creek.[3,20] This facility now has a capacity of servicing 2,300 persons, but it is being enlarged to a service capacity of 3,500 persons. This expansion should be complete by the end of 1981. A further expansion, to a 7,000 person capacity, is forthcoming within 1-1/2 years. The treatment plant will ultimately be expanded to a 4.32 MGD treatment capacity with a service population of 10,000.[3]

Prior to completion of the first stage of the new treatment facility, an older treatment plant was used. This facility provided a treatment capacity of only .75 MGD. It will be retained for emergency use and to supplement service during future expansions of the new plant.[3]

Storage capacity of the system is 1.5 MGD and has a population capacity of 6,000 persons.[1] The storage and distribution system, rebuilt in 1965, is in good condition, has an average capacity of 250 gpd/person, and meets applicable state and local standards.[2]

3.2.4 Wastewater Treatment System

The Rangely Sanitation District provides wastewater collection and treatment to Rangely. A treatment plant is located near the White River.

The sewage treatment plant is being constructed in several stages. The first stage is now in use with a design capacity of 4,000 persons and a treatment capacity of 0.4 MGD. It will soon be expanded from its present capacity to serve 6,500 people.[1,20] The treatment plant will ultimately be expanded to serve 10,000 persons with a treatment capacity of 1.0 MGD.

Since the present population of Rangely is only 2,100, the treatment facilities are more than adequate at this time. Future expansions have been coordinated with projected population increases.

3.2.5 Schools

Rangely is within the jurisdiction of the Rio Blanco County School District RE-4. District RE-4 has one elementary school with a capacity of 450 students, one junior high school with a capacity of 500 students, and one senior high school with a capacity of 250 students. Enrollment at all grade levels is well below capacity.

The RE-4 District schools could accommodate up to 1,200 total pupils, but in 1980 the district had only 585 enrollees.

The Rio Blanco County District has a teacher/pupil ratio of 1:14.3, well below the state average of 1:19.6. This district could enroll an additional 200 pupils at the same staff level before exceeding the state average.

The District also compares favorably with the state in terms of teacher turnover rates and the percentage of faculty with Master's degrees.[3]

3.2.6 Law Enforcement and Fire Protection

The Rangely Police Department has four full-time officers, three patrol cars, and a two-cell detention facility.[2] In addition, the County Sheriff's Department has three full-time deputies in Rangely, and the Colorado Highway Patrol has two patrolmen stationed in Rio Blanco County. The ratio of municipal law enforcement officers to Rangely's population is 1.9:1000, which compares with the recommended standard of 2.3 officers per 1,000 population. (See Section 7.1.)[1,2]

Fire protection in Rangely is provided by an all volunteer force with 22 active members, and five vehicles. The fire department has one 1250 gpm pumper, and 1,100-gal. tanker, and one 90 gpm "quick attack" truck.[2] Rangely has a fire protection class rating of 8, where 1 is most adequate and 10 is the least adequate.[1]

Rangely is seeking ways to enlarge the fire department's capacity to serve a population up to 6,000 persons. Capital improvement funds have been made available for a 3,200 square foot addition to the fire station and application has been made for a 601 Grant. The department has obtained funding to purchase a 750 gpm pumper to replace a 1947 truck.[27]

3.2.7 Health Care Facilities

The Rangely District Hospital is the only acute care facility in the Rangely area. It has 28 beds and a service area population of 3,825, or one bed per 137 persons. The facility is currently used at 22 percent of capacity.[1] Ambulance service is provided for the Rangely area.[3]

The ratio of full time equivalent practitioners to Rangely area's population is 1:1,912, which is substantially below the state average of 1:587.[1,2] To achieve the state average in Rangely, 4-5 additional physicians would be needed. If additional physicians were available locally, the hospital occupancy rate would probably increase. More patients would probably seek care locally rather than traveling to other communities which offer a wider range of health services.

The Rangely District Hospital could service between 7,000 and 9,000 persons, assuming a service standard in the range of 3-4 beds/1,000 population and a sufficient local pool of physicians. This is two to three times larger than the existing population of the hospital's service area, and 2.5 to 4.5 times larger than Rangely's existing population.

The ratio of dentists to the Rangely service area population is 1:3,825,[1] which is also below the state average of 1:2,112.[2] To achieve the state average in Rangely, one additional dentist is needed.

3.2.8 Transportation

Rangely's primary road system centers around Colorado State Road 64, connecting Rangely to US-40. An existing road also connects SR-64 to Bonanza, Utah. (See Figure 1.1)

The Rangely airport provides some transportation services. It has an asphalt runway that is approximately 4,500 ft. long and is lighted at night.

TABLE 3.1-1

ASHLEY VALLEY EXISTING WATER SYSTEM

Measurement Unit	Existing Capacity	Design Population	1980 Population	Peak Demand	Surplus (+) Deficit (-)
WATER SYSTEM					
SUPPLY[1]	9.0 MGD	20,100	16,000	8.65 MGD	+ .35 MGD
TREATMENT[2]	-	-	-	-	-
DISTRIBUTION[3]	4.5 MGD	10,400[4]	16,000	8.65 MGD	-4.15 MGD

---

1. Includes only Ashley Springs. In addition, ample supplies of water exist within the Valley between Ashley Springs and Red Fleet Reservoir to maintain a population of 40,000.
2. Proposed treatment plants for both Ashley Valley and Vernal would handle at least 15 MGD.
3. Adequate flow is available to Vernal and Maeser Districts. Shortfalls occur in Ashley Valley and Jensen Districts.
4. In terms of peak demand

Source: Gibbs & Hill, Inc.

TABLE 3.1-2

ASHLEY VALLEY EXISTING SEWER SYSTEM

Measurement Unit	Existing Capacity[2]	Design Population[1]	1980 Population	Existing Flow[3]	Surplus (+) Deficit (-)
WASTEWATER COLLECTION AND TREATMENT	9.8 MGD	40-50,000	16,000	1.5 MGD	+ 8.3 MGD

---

1. Upon completion of collection lines outside Vernal City, demand flow will increase considerably, but at the existing Valley population, will be well within the system's design capacity.
2. Design capacity of new wastewater treatment plant: may begin operation August, 1981; existing plant serving Vernal City only has a 1.0 MGD capacity.
3. Vernal City only; collection lines outside City not complete at July 1981.

Sources: Kaye Overson, Vernal City Department of Public Works, July 1981
Russ Vernon, Uintah Engineering, June 1981

TABLE 3.1-3

VERNAL CITY EXISTING SOLID WASTE COLLECTION AND DISPOSAL

SERVICE	Garbage Collection
SERVICE AREA POPULATION	6,600 Population
NUMBER OF HOUSEHOLDS @ 3.44 Persons per Household	1,940 Households
TIME REQUIRED - To Collect Vernal Garbage with 4-man Crew	33 Hours
TIME REQUIRED PER PICK-UP	1 Minute
EXCESS MANHOUR CAPACITY - 40-Hour Workweek	7 Hours (420 Minutes)
ADDITIONAL HOUSEHOLDS THAT CAN BE SERVED	420 Households
ADDITIONAL POPULATION THAT CAN BE SERVED	1,400 Persons
THRESHOLD POPULATION (Additional Manpower/Equipment Needed)	8,000 Persons

---

NOTE: The landfill is currently filled to about 25 percent capacity. According to the Vernal Department of Public Works, it will not be filled to capacity in the foreseeable future.

Source: Vernal City Department of Public Works, June, 1981.

TABLE 3.1-4

UINTAH COUNTY SCHOOL ENROLLMENT, 1981

School Level	Enrollment	Capacity	Location
ELEMENTARY:			
Ashley Elementary	522	500	Vernal
Central Elementary	395	400	Vernal
Maeser Elementary	601	500	Maeser
Naples Elementary	555	373	Naples
Todd Elementary	632	525	RFD2 (near Roosevelt)
Discovery Elementary	608	500	Vernal
Portable Classrooms	200	200	Vernal
	3,513	2,998	
JUNIOR HIGH:			
Vernal Junior High	893	775	Vernal
West Junior High	250	250	RFD2 (near Roosevelt)
	1,143	1,025	
SENIOR HIGH:			
Uintah High	773	800	Vernal
TOTAL	5,429	4,823	
PRIVATE SCHOOLS:			
District Learning Center for the Handicapped	80	120	Maeser
Country Meadows Preschool	20		Maeser
ADULT EDUCATION FACILITIES	60	60	Vernal

Source: Denise Lindberg, Ph.D. Community Based Educational Planning Specialist, Utah Office of Education; personal communication, April 1981.

TABLE 3.1-5

UINTAH COUNTY SCHOOL DISTRICT SURPLUSES AND DEFICITS, 1981

Measurement Unit	Recommended Service Level	Actual Service Level	Surplus (+) Deficit (-)
LAND AREA (In Acres) AT 6 ACRES/1,000 POPULATION	125	185	+ 62[1]
TEACHERS AT 25 PUPILS/TEACHER	217	219	+ 2[2]
PUPIL CAPACITY	5,429 (existing enrollment)	4,823	-606[3]
SCHOOLS AT 500 PUPILS/SCHOOL	11	9	- 1[4]

---

1. In addition, Uintah County School District owns several vacant properties totaling 135 acres.
2. Elementary: 115 teachers (21 pupils/teacher). Special Education: 10 teachers (13 pupils/teacher). State Average: 22.9 pupils/teacher.
3. Even with completion of new elementary school in 1980, the District operates well above capacity. Recently, funding for a new elementary school was voted down by a 2:1 margin.
4. Elementary school is most critically needed.

Service Area: Uintah County
Population: 20,506
No. of Pupils: 5,429

Sources: Denise Lindberg, Ph.D. Community-based Educational Planning Specialist, Utah Office of Education, April 1981
Richard Tolley, Finance Officer/Clerk-Treaserer, Uintah County School District, May 1981
Department of the Interior, Bureau of Land Management, Moon Lake Power Plant Final EIS, April 1981.

TABLE 3.1-6

HEALTH CARE FACILITY SURPLUSES AND DEFICITS
IN UINTAH COUNTY, 1981

Measurement Unit	Recommended Standard	Recommended Service Level	Actual Service Level	Surplus (+) Deficit (-)
HOSPITAL BEDS	4 Beds/1000 Population	82 Beds	36 Beds	-46 Beds[1]
PRACTITIONERS (Full-time Equivalent)	1.88 Doctors/ 1,000 Pop.	39 Doctors	12 Doctors	-27 Doctors[2]

---

1. According to the hospital administration, hospital occupancy averages between 65 and 70 percent capacity.
2. The recommended service level for hospital beds assumes an adequate supply of local practitioners. As indicated here, Vernal has a serious shortage of physicians.

Service Area: Uintah County
1980 Population: 20,506

Source: Gibbs & Hill, Inc.

TABLE 3.1-7

SOCIAL SERVICE SURPLUSES AND DEFICITS IN ASHLEY VALLEY, 1980

Service	Recommended Standard	Recommended Service	Existing Service	Surplus (+) Deficit ( )
MENTAL HEALTH[1]	1 Psychiatric Social Worker/10,000 Population	2 Psychiatric Social Workers	1 Mental Health Specialist with Master's Degree	-1 Psychiatric Social Worker
	1 Clinical Psychiatrist/ 20,000 Population	1 Clinical Psychiatrist	1 Part-time Psychologist 1 Part-time Psychiatrist	-0-
	4 Beds/25,000 Population	3.2 Beds	0 Beds - No Local In-patient Service Available	-3.2 Beds
ALCOHOL REHABILITATION[2]	1 Alcohol Rehabilitation Counselor/10,000 Pop.	2 Alcohol Rehabilitation Counselors	1 Counselor for Both Alcohol and Drug Abuse; Out-patient Service Only	-1 Counselor
DRUG TREATMENT[2]	1 Nurse/10,000 Population	2 Nurses	No De-toxification Program Available Locally	-2 Nurses
DAY CARE[3]	1 Day Care Center/5,000 Population	4 Day Care Centers	Home-based State Program	-4 Day Care Centers
YOUTH SERVICES[4]	1 Youth Employment Counselor/ 10,000 Population	2 Youth Employment Counselors	None	-2 Counselors
	1 Juvenile Problem Officer/ 10,000 Population	2 Juvenile Problem Officers	1 Diversion Program Staff Member	-0-
	1 Youth Guidance Home/ 50,000 Population	.43 Youth Guidance Home	1 Detention Home Shelter Facility	-0-

---

1. Currently, there is a 3-4 week waiting list for those requiring a case worker. An in-patient facility is needed.
2. In-patient social and medical de-toxification facility is needed.
3. A home-based program with 50 paid day care providers is licensed and administered by the Utah Department of Social Services.
4. A youth/family resource center is desireable. A crime diversion program to keep juveniles out of the criminal justice system is operated. The youth guidance home is now under construction, due for completion June 1982.

Source: McCord Marshall, Director, Uintah Basin Social Services, Utah Department of Social Services District No. 6.

TABLE 3.1-8

ASHLEY VALLEY RECREATIONAL FACILITIES, 1981

Facilities	Number Serving Ashley Valley
PARKS	1
STATE/NATIONAL RECREATIONAL AREAS	4
CAMPING AREAS	3
RESORTS	1
LAKES AND RIVERS	0
RESERVOIRS	3
SNOWMOBILE TRAILS	1
CROSS-COUNTRY SKI TRAILS	1
HEALTH SPAS	1
POOLS	1
TENNIS COURTS	10
RACQUETBALL COURTS	2
GOLF COURSES	1
GAME CENTERS	3
BOWLING ALLEYS	1
BASEBALL/SOFTBALL COMPLEX	1
SKATING RINKS	1
THEATERS, INDOOR	3
THEATERS, DRIVE-IN	1
COUNTRY CLUBS	1
AUDITORIUMS	0

Source: Gibbs & Hill, Inc.

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5. Uintah Basin Association of Governments and APA Planning and Research; October, 1980. Uintah Basin Oil Shale Impact Study, Interim Reports. Salt Lake City.

6. Uintah Basin Association of Government and Uintah Basin Energy Development Council, July 1, 1980. Uintah Basin Oil Shale Impact Study, Interim Report. Salt Lake City.

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8. Uintah Engineering, Revised Ashley Valley Wastewater Facilities Design Report. Vernal, Utah.

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13. Robert Hugie, Assistant City-County Planner, Vernal City and Uintah County; personal communication, April, 1981.

14. Carl Jensen, Supervisor, Vernal Sewer and Water District; personal communications, May, June, July, 1981.

15. Denise Lindberg, Ph.D., Community Based Educational Planning Specialist, Utah Office of Education; personal communication, April, 1981.

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17. Craig Merrill, Health Planning and Policy Department, Utah State Planning Office; personal communication, April, 1981.

18. Veda Muller, Town Clerk, Rangely Colorado; personal communication, July, 1981.

Personal Contacts (Continued)

19. Kaye Overson, Director Vernal Department of Public Works; personal communication, July, 1981.

20. Don Peach, Town Administrator, Rangely; personal communication, July, 1981.

21. Ronald Perry, Administrator, Uintah County Hospital; May, 1981.

22. Gary Stetler, District Manager, Utah Gas Service Company, Vernal; personal communication, June, 1981.

23. Richard Tolley, Finance Officer/Clerk-Treasurer, Uintah School District; personal communication, May, 1981.

24. Russ Vernon, Uintah Engineering, Vernal, Utah; personal communications, March, July, 1981.

25. Kim Wilson, Utah Insurance Service Office; personal communication, July, 1981.

Other Source Materials

26. Eastern Montana Social and Community Service Task Force, Adequacy Standards for Social Services, September, 1980.

27. Rangely, Colorado: Map 198081 Capital Budget.

28. Rangely, Colorado: Floodplain Boundary Map, December, 1977.

29. Rangely, Colorado: Official Zoning Map, August, 1979.

Other Source Materials (Continued)

30. Thomas Smith, Consultant to Department of Energy, Utah Department of Public Safety; personal communication, April, 1981.

31. Robert Downard, Chief, Vernal Police Department; personal communication, April, 1981.

32. Arden Stewart, Sheriff, Uintah County; personal communication, May, 1981.

33. Lt. Howard Powell, Supervisor for Uintah County, Utah Highway Patrol; personal communication, May, 1981.

34. Dale Slaugh, Chief, Vernal Volunteer Fire Department; personal communication, May, 1981.

35. D. L. Wetenkamp, Executive Vice-President, Vernal Chamber of Commerce; personal communication, April, 1981.

4.0 PUBLIC BUDGETS AND TAX BASE

4.1 UINTAH COUNTY LOCAL BUDGETS

The major local government bodies in Uintah County are the Uintah County, headed by three Commissioners; the City of Vernal, directed by a mayor and five councilmen; and the Uintah School District, directed by a Superintendent of Schools. The County Government is responsible for public service in municipalities and unincorporated sections of Uintah County, including Ashley Valley, while the City of Vernal is responsible for public services within the Vernal City limits. The Uintah School District serves the entire County. (See Table 4.1-1.)

The combined 1980 operating budgets of the governments exceeded $20 million. The single largest expense for the Uintah County Government was public roads. For Vernal City, the public works sector accounted for the greatest portion of its expenditures. In terms of 1980 revenues and expenditures, all three governing bodies experienced a revenue surplus. (See Table 4.1-2.)

In addition to the above, there are four separate local government entities which are responsible for water supply and sewage collection and treatment in Uintah County. Aside from the small Jensen and Maeser Water Improvement Districts, the two most important entities responsible for water and sewer service are the Vernal Sewer and Water District and the Ashley Valley Water and Sewer Improvement District. The combined operating budgets for the Vernal and Ashley Valley Systems exceeded $4 million in 1980. (See Table 4.1-2.)

The mill levy for all county-wide government was 61.76 in 1981. Additional mill levies for water and sewer service and Vernal city services were applied to sub-areas within the county. (See Tables 4.1-3 and 4.1-4.)

4.2 UINTAH COUNTY TAX BASE

The ability of the public sector to cope with the increasing demand for services is governed by the size and growth rate of its tax base. A main concern for the communities impacted by energy growth will be providing the needed services without requiring bonded indebtedness that exceeds the statutory limits set by the state of Utah.

4.2.1 Property Tax

Property tax data, including assessed valuation, and allowed and available bonded indebtedness are presented for the five local government bodies in Uintah County described in Section 4.1. In 1980, the combined allowed indebtedness for Uintah County, Vernal City, Uintah School District, and the two water and sewer districts amounted to $36.7 million. Indebtedness in 1980 was estimated at $5.2 million for future projects, distributed as follows (see Table 4.2-1.):

- In 1980, the assessed valuation for Uintah County was $90.7 million. Allowed indebtedness under State Law is 10 percent of assessed value, or $9.1 million. The hospital bond accounts for $2.5 million in debt, leaving $6.6 million available for future projects.

- The Uintah School District had, as of 1980, an assessed valuation of $90.7 million. Allowed indebtedness is 15 percent of assessed value, or $14.5 million. Presently, there is no indebtedness, allowing for a total available indebtedness of $14.5 million.

- The tax base for Vernal City is substantially lower than that for the County and the School District. In 1980, Vernal City property was assessed at $19.0 million. Allowed indebtedness for Vernal City is 20 percent of assessed value, or $3.8 million. Because there is no present bonded indebtedness, $3.8 million is available for future projects.

- The Vernal Sewer and Water District has a total allowed indebtedness of 40 percent of assessed value, or $6.8 million. Given current debt, $5.7 million remains for future projects.

- The Ashley Valley Water and Sewer Improvement District has a total allowed indebtedness of $2.5 million. Current debt is presently estimated at $1.6 million. The remaining available indebtedness for future projects is $0.9 million.

The available indebtedness is expected to increase because of adjustments to county assessments in 1981 and 1982 according to the County Clerk-Auditor.

4.2.2 Sales Tax

The sales tax is another segment of the area tax base. Uintah County and the city of Vernal receive substantial sales tax revenues. The Utah sales tax is currently at 4.75%, with .75% returning on a quarterly basis to the city or county where the sale was made, and the other 4.0% added to the general fund for the State of Utah. According to the Vernal financial office and county audit, Vernal received about $900,000 in sales tax returns in fiscal 1978-80 and over $1.3 million in 1980-81. The County received over $200,000 in sales taxes in 1979.

Sales tax returns represent one form of tax revenue that increases at the same time as population. Vernal and Uintah County can anticipate increased sales tax revenue at a rate that is roughly proportionate to area population increases.

4.3 FUTURE TAX BASE GROWTH

As the county and valley grow, the value of property and the allowed indebtedness for utilities and community facilities will also grow. If

the energy projects are built, then the tax base will increase substantially, and debt limits will increase accordingly. (See Table 4.2-2.) The County government and school district will receive the full benefit of this new growth.

There will be a trade off between increased debt service, and other costs induced by capital requirements for growth, and increased tax revenues generated by the substantially expanded tax base. Each government will be affected differently by the trade off. To illustrate, the long-term effects on the School District, the County, and other jurisdictions are discussed below:

- School District - State regulations regarding the financial support of school operating budgets provide that all counties receive the same funding per pupil. According to the county school district treasurer, all boards are required to collect property taxes for school operations at the same mill rate, which was 23.25 mills in 1980. The State makes up the difference between the property tax and a per pupil calculation, $1,006 in 1981. As a result, a change in the tax base does not change the district's operating budget.

  A change in the tax base, would, however affect the capital budget and miscellaneous funds, such as the recreation and transportation funds. The capital outlay account is totally funded by a property tax assessment. The current rate is 18 mills. As assessments increase, the yield from such a levy would also increase.

  By 1994, baseline growth and growth induced by energy projects will generate a need for classroom space to accommodate 5,482 additional students. The capital cost for these facilities will be on the order of $38 million; the debt service payments would be about $4.6 million by 1994. (See Table 4.2-2.)

- County - Unlike the School District, the increased tax base will be of benefit to the County in funding its operation needs. Property tax revenue is the largest single source of County government revenue, supplying over $1 million to the general fund each year. Operating costs are expected to increase roughly in proportion to population.

  Non-property tax revenues are expected to increase at least in proportion to population, due to the anticipated relatively high income of the future population and other factors. However, the property tax base is expected to grow much in excess of population growth, thereby enabling a lower mill rate to yield the required revenues, with savings, compared to current levies. On the other hand, growth may require additional outlays for roads and other facilities. The debt service required to finance them will be in proportion to the number and cost of the facilities.

- Other Jurisdictions - Some adjustments to current regulations would be required to enable the water and sewer districts in the Ashley Valley, and the Vernal city government, to share directly in the tax base increase.

4.4 REVENUE TIMING AND DISTRIBUTION

In the long run, after the new energy facilities are in operation, the economic and fiscal benefits of growth are expected to be more than enough to pay for construction and operation of all the new public facilities required. A case study of six energy impact cities in western Colorado reached this conclusion. It has long been acknowledged, however, that, during the growth period itself, the County will probably be hard-pressed to keep ahead of growing public needs. "The basic problem is timing and distribution of tax revenues to support new development when and where needed."[2]

To illustrate this potential problem, the long-term fiscal impact on Uintah School Board, addressed in Section 4.2, can be measured against the annual projected impacts during the construction period.

In the long run, the number of school children is estimated to grow by about 100 percent. If growth were steady, at a rate of 7-8 percent per year for the next 13 years, then the provision of new facilities would be more manageable. However, growth is expected to be much greater in the early years, reaching almost 100 percent by 1987, and then peaking at 12,887 in 1990. (See Appendix C, Table C-7.) If this projection is realized, then the new schools would have to be provided over six years and not 13 years.

The tax base is not expected to increase in proportion to the growth in the number of schoolchildren. The tax base will be determined by the number of facilities and equipment already in place, which will lag behind the needs of the construction workforce population. Because of the lead time required to construct facilities, the decision to go forward on a construction project should ideally precede the increase in school population.

A number of measures are being considered to mitigate the problems associated with rapid growth. To mitigate the lead time problem, for example, state loans and grants and prepayment of property taxes are available options.

4.5 BONUS PAYMENTS

The owner companies of WRSP have paid the federal government $72 million in bonus payments for Tracts U-a and U-b. These bonus payments were impounded in November, 1976 pending the resolution of title. Since then, the money has been drawing interest and is presently estimated at $115 to $120 million.

Once the title issue is resolved, the State of Utah will receive from the federal government 37-1/2 percent to 50 percent of the bonus payments, or $45 to $60 million. This portion of the bonus payments would then be available for impact mitigation.

In 1977, the State of Utah passed Senate Bill 138, which provides that "all monies" (received from these bonus payments) shall be deposited in the natural resources development revolving account. This account will be used for the following purposes: 1) planning; 2) construction and maintenance of public facilities; and 3) public services. The state legislature has the authority to "appropriate the amount in this account for loans, either totally or partially, to the community impact account under Section 63-5-1, to the board of water resources for loans under Sections 73-10-8 and 73-10-23 or to counties, cities, towns, or other political subdivisions of this state socially or economically impacted by the development of these minerals." (Section 65-1-115, Utah Code Annotated.) Uintah County should receive funds for impact mitigation from this source.

4.6 ROYALTY PAYMENTS

The White River Shale Project will have the potential of producing a large amount of royalty money for the State of Utah. Under current development plans, mineral royalties are estimated to be approximately $2 million in 1985 and approximately $25 million in 1994. According to present statutes, one-half of that money would be returned to the State.

The State distributes its portion of the mineral lease revenues as shown below:

32.5% - Community Impact Fund (a fund for impacted municipalities to draw upon for grants and loans; the fund is

administered by the Utah Department of Community Development)

33.5% - Higher Education

2.25% - State Office of Higher Education

2.25% - Utah Geological and Mineral Survey

2.25% - Water Research Laboratory

27.25% - Annual Appropriation by Legislature

Under this distribution system, a part of the royalties should return to Uintah County in the form of impact mitigation. Both the Community Impact Fund and the State Legislature can allocate funds to entities within the County for specified projects (Utah Code Annotated, Section 65-1-64.5).

TABLE 4.1-1

RESPONSIBILITIES AND BUDGETS OF GOVERNMENTAL UNITS
WITHIN UINTAH COUNTY,
1980

Governmental Unit		Operating Budget	Employees	Service Area Population
UINTAH COUNTY	Administration, Planning, Education, Public Safety, Highways, Weed Control, Health & Hospitals, Parks & Recreation, Cemeteries, Library	$ 9,939,293	120	20,247 persons
UINTAH SCHOOL DISTRICT	Schools	12,059,742	6[1]	5,429 schoolchildren
VERNAL CITY	Administration, Public Safety Public Works, Sanitation, Utilities, Parks & Recreation, Cemeteries	1,432,000	75	7,000 persons
VERNAL	Water Distribution	568,500		2,300 connections
VERNAL	Sewer Collection/Treatment	189,000		2,300 connections
ASHLEY VALLEY WATER & SEWER IMP. DISTRICT	Water Distribution	[2]		[2]
ASHLEY VALLEY	Sewer Collection/Treatment	3,520,158[3]	2	6,500
TOTAL		$ 27,708,693	203	

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1. Excluding school operating staff
2. See Ashley Valley sewer collection and treatment
3. Includes total for water and sewer

Sources: Uintah County Government, as supplied by Ms. A. Pope. Vernal City Government, as supplied by Mr. McDonald. Uintah School District, as supplied by Mr. R. Tolly. Ashley Valley Water and Sewer Improvement District, as supplied by Mr. T. Caldwell.

TABLE 4.1-2

REVENUES AND EXPENDITURES OF
UINTAH COUNTY GOVERNMENTAL UNITS, 1980

	Revenues	Expenditures
UINTAH COUNTY	$10,500,000	$ 9,939,293
CITY OV VERNAL	1,701,000	1,432,000
UINTAH SCHOOL DISTRICT	12,593,185	12,059,742
Subtotal	24,794,185	23,431,035
VERNAL:		
Water	685,000	568,500
Sewage	250,000	189,000
ASHLEY VALLEY WATER AND SEWER	3,521,000	3,520,158
Subtotal	4,456,000	4,277,658
TOTAL	$29,250,185	$27,708,693

Sources: Uintah County Government, as supplied by Ms. A. Pope.
Vernal City Government, as supplied by Mr. McDonald.
Uintah School District, as supplied by Mr. R. Tolly.
Ashley Valley Water and Sewer Improvement District, as supplied by Mr. T. Caldwell.

TABLE 4.1-3

UINTAH COUNTY MILL LEVIES,
1981

	Mills
COUNTY[3]	
GENERAL PURPOSE	12.34
LIBRARY	.86
TORT LIABILITY	.35
HOSPITAL BOND	2.81
SUBTOTAL	16.36
SCHOOL DISTRICTS[4]	
MANDATED	23.25
CAPITAL FUND	18.00
OTHER[1]	2.50
SUBTOTAL	43.75
OTHER[2]	1.653
TOTAL	61.76

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1. Recreation fund, liability, special transportation fund
2. Uintah Water Conservancy District Supply, Mosquito Abatement
3. Uintah County Clerk-Auditor, Mr. M. Cook
4. Uintah School District, Mr. R. Tolly, Treasurer

Source: Gibbs & Hill, Inc.

TABLE 4.1-4

ASSESSED VALUATION AND MILL LEVIES IN
UINTAH COUNTY SPECIAL DISTRICTS,
1979

Taxing Units	Valuation	Levy in Mills
VERNAL CITY	$17,099,177	3.24
ASHLEY VALLEY WATER AND SEWER	15,969,049	4.00
MAESER WATER	2,854,373	2.31
JENSEN WATER	2,275,868	4.00
BALLARD WATER	1,811,164	3.80
OURAY PARK WATER	695,915	6.41
TRIDELL-LAPOINT WATER	2,052,580	4.00

Source: Uintah County Audit Report, December 31, 1979, page 39

TABLE 4.2-1

PRESENT AND AVAILABLE INDEBTEDNESS
IN GOVERNMENTAL UNITS WITHIN UINTAH COUNTY,
JANUARY 1980

Governmental Unit	Allowed Indebtedness	Present Indebtedness	Project Description	Available Indebtedness
UINTAH COUNTY	$ 9.07 million	$ 2.50 million	Hospital	$ 6.57 million
UINTAH SCHOOL DISTRICT	14.48 million			14.48 million
VERNAL CITY[1]	3.42 million			3.42 million
VERNAL WATER & SEWER DIST.	6.84 million	1.10 million	Sewer	5.74 million
ASHLEY VALLEY WATER &[2] SEWER DISTRICT	2.50 million	1.60 million		0.90 million
TOTAL:	$ 36.31 million	$ 5.20 million		$ 31.11 million

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1. The Vernal City allowed indebtedness excludes an additional allowed indebtedness which is calculated at 8 percent of the property's fair cash value and is given for a water, sewer, or lighting system. This allowed debt is indicated for the Vernal Water and Sewer District.
2. Estimated.

Sources: Uintah County Government, as supplied by Ms. A. Pope and supplemented by County Report of Audit, December 31, 1979, page 39
Uintah School District, as supplied by Mr. R. Tolly
Vernal City Government, as supplied by Mr. McDonald
Ashley Valley Water and Sewer Improvement District, as supplied by Mr. T. Caldwell

TABLE 4.2-2

CAPITAL NEEDS ESTIMATE FOR UINTAH COUNTY SCHOOLS, 1994

Item	Amount
SCHOOL CHILDREN, 1994[1]	10,911
CAPACITY AVAILABLE, 1981	5,429
NEW CONSTRUCTION REQUIRED	5,482
CONSTRUCTION COST PER PUPIL[2]	7,000
CAPITAL COST	$38,374,000
DEBT SERVICE MULTIPLIER[3]	.12
DEBT SERVICE	$ 4,605,000

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1. Gibbs & Hill estimate; see Appendix C for derivation.
2. Gibbs & Hill estimate.
3. Assume interest rates on tax-exempt municipal bonds to not exceed 11 percent. This is a conservative assumption.

Source: Gibbs & Hill, Inc.

REFERENCES - SECTION 4.0

1. Uintah County School District, Mr. R. Tolly; telephone conversations, May 20 and July 7, 1981.

2. University of Colorado Graduate School of Urban and Regional Planning and Briscoe, Maphis, Murray, and Lamont, Management Consultants, Tax Lead Time Study, The Colorado Oil Shale Region, 1974.

3. Burchell, Listokin, The Fiscal Impact Handbook, 1978.

4. Uintah Basin Association of Governments, The Uintah Basin: A Statistical Review.

5. Western Environmental Association, Inc., Baseline Description of Socio-Economic Conditions in the Uintah Basin, June, 1975.

6. Western Environmental Association, Inc., Socio-Economic Impact Study of Oil Shale Development in the Uintah Basin, November, 1975.

7. Ashley Valley Water and Sewer Improvement District, Mr. T. Caldwell; telephone conversation, May 20, 1981.

8. State Tax Office, Mr. E. Osika; telephone conversation, July 1, 1981.

9. Uintah County Government, Mr. A. Pope; telephone conversations, May 20 and July 7, 1981.

10. Vernal City Government, Mr. McDonald; telephone conversations, May 20 and July 7, 1981.

11. Department of Local Affairs, Boom Town Financing Study, Vol. 1, Denver, 1976.

5.0 SOCIO-CULTURAL ENVIRONMENT

5.1 DEMOGRAPHY OF UINTAH COUNTY

In 1950, the population of Uintah County was 10,300. From 1950 to 1970, County population grew slowly, slightly less than one percent per year. By 1970, it reached 12,479. In the 1970's, the county population grew at an average annual rate of over 7 percent per year. By 1980, the population of Uintah County reached 20,247. (See Table 5.1-1.)

The Ashley Valley is the dominant settlement of Uintah County. It is estimated that the Valley had 6,695 persons in 1950, or 65 percent of all county residents. From 1950 to 1970, the area outside of the Ashley Valley lost population, and the Valley captured all the county growth. By 1970, the Valley's share of county population is estimated to have grown to 76 percent of the county's population. (See Tables 5.1-2 and 5.1-3.)

During the 1970's, both the Valley and the other areas of the county grew substantially. The Valley grew from 9,489 in 1970 to 16,168 in 1980, an average annual rate of about seven percent. The 1980 Ashley Valley figure represents 80 percent of Uintah County residents. (See Tables 5.1-2 and 5.1-3.)

The major municipality in the Ashley Valley is Vernal. The high growth rate of the 1970's was shared by Vernal. In 1970, Vernal had 3,908 residents, or 41 percent of all residents in the Ashley Valley. By 1980, Vernal reached 6,600 persons, or 40.8 percent of all residents of the Valley. The immediate area outside of Vernal grew by almost 4,000 persons from 5,581 to 9,568 in the same period. (See Table 5.1-4.)

5.1.1 Uintah County Households

In 1980, Uintah County had 5,886 households, of which 4,841 were in the Ashley Valley. Of these Ashley Valley residents, 2,185 lived within the

Vernal city limits. (See Table 5.1-5.)

Utah has the highest ratio of persons per household in the United States. The average population per household in Uintah County in 1980 was 3.44, which is typical of Utah, but relatively high compared to most other places in the region. (See Table 5.1-5.)

5.1.2 Age and Sex Characteristics

Population distribution by age and sex in Uintah County is generally typical of Utah. There are no substantial departures in any age group. There is a relatively high proportion of children, 44.0 percent in Uintah County compared to 41.1 percent in the state. Uintah County has relatively fewer 20-29 year-olds, 17.5 percent, compared to 19.9 percent for the state. This may reflect a tendency towards out-migration of this productive group. (See Table 5.1-6.)

5.1.3 Growth Projections

Baseline growth projection for Uintah County, under the assumption that no energy projects are built, would result in a population growth of over 18 percent from 1980 to 1994. Uintah County would grow from 20,247 to 24,069 persons. The Ashley Valley would grow from 16,008 to 18,698. (Appendix C. Tables C-6 and C-8.)

5.1.3.1 High Growth

Under the high growth assumption that all projects are built as scheduled, Uintah County could grow from about 20,000 to a peak of over 53,000 in 1990, and level off at about 45,000 in 1994. The number of households would triple, from 5,886 in 1980 to 19,300 in 1990. Of course, many of the new households would be single construction workers, so the average household size of the newcomers would probably be considerably smaller than that of the current residents. By 1994, the number

of total households in Uintah County could level off at about 15,000. (See Table 5.1-7.)

The Ashley Valley is expected to accommodate much of the growth, with the exception of bachelor construction workers who are expected to reside in camps outside of the Valley. Ashley Valley population is projected to peak at about 40,500 in 1990, and thereafter level off at about 35,000 in 1994. The number of households is estimated to grow from 4,653 in 1980 to over 13,000 in 1990, and to level off at about 11,500 by 1994. (See Table 5.1-8.)

5.1.3.2 WRSP-Induced Growth

Based on the high growth projections, population in 1994 would grow by 122 percent compared to 1980. About half of that increment could be attributable to the WRSP. The balance would be generated by baseline growth and other energy projects.

In 1994, about 12,000 persons, or 27 percent of Uintah County's population of 45,000, would be attributable to the WRSP. (See Table 5.1-9.) Direct WRSP population may represent 11 percent of 1994 county population, and indirect WRSP population could represent an additional 16 percent. (Tables 5.1-9, 5.1-10, Figure 5.1-1, and Appendix D.)

5.2 DEMOGRAPHY OF RIO BLANCO COUNTY

In 1960, the population of Rio Blanco County was 5,150. The county's population declined in the 1960's to 4,842 by 1970. During the 1970's, the population increased at an average annual rate of 1.4 percent, to reach 6,255 by 1980. (See Table 5.1-11.)

In 1970, Rangely, Colorado, had 1,591 residents, slightly under one-third of the county's population. In the 1970's, Rangely grew at a slightly higher rate than the rest of Rio Blanco County. By 1980,

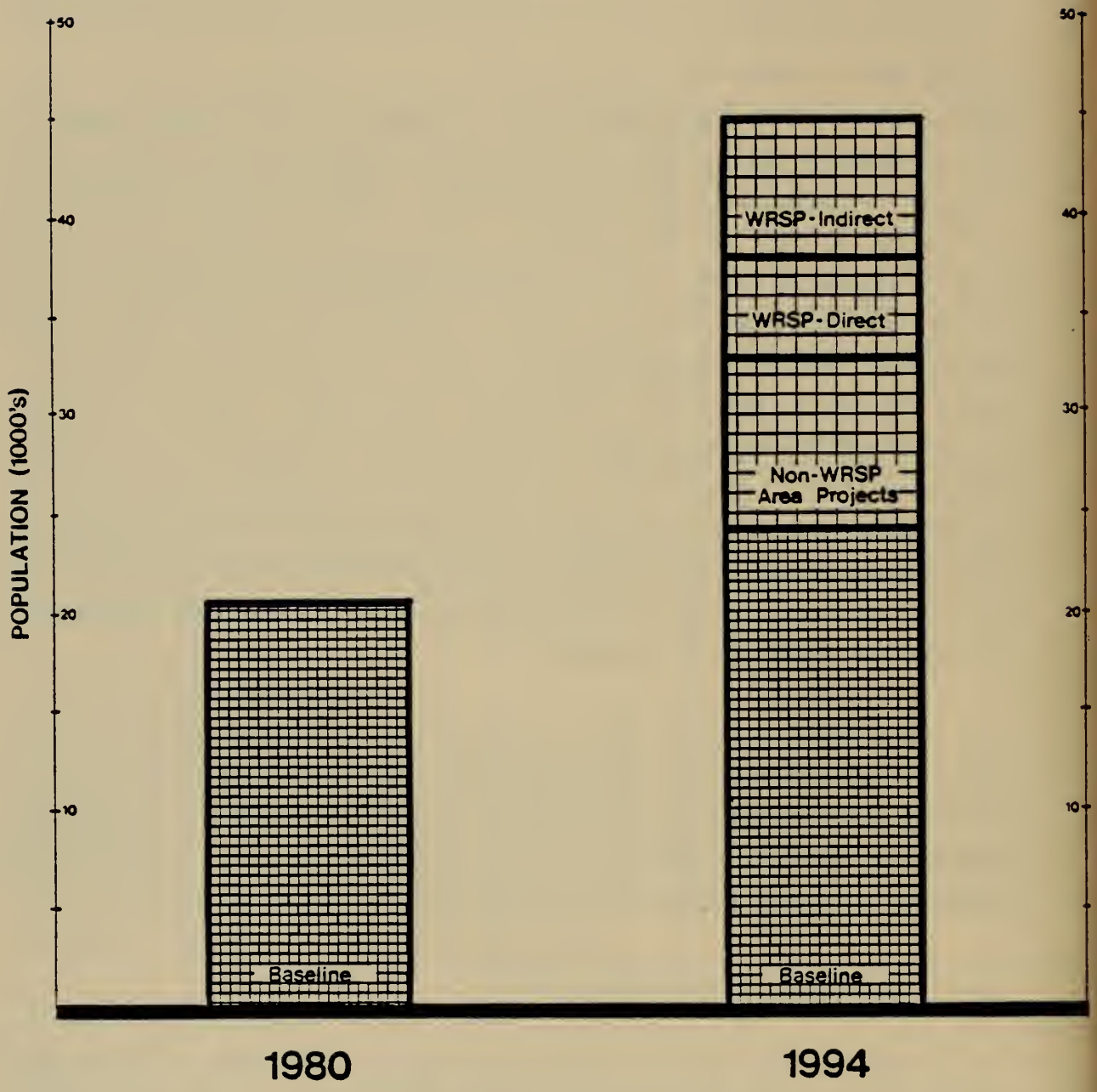

Figure 5.1 Uintah County Growth Components - 1980 and 1994

Gibbs & Hill, Inc.

Rangely reached 2,113 residents, or about 34 percent of Rio Blanco County's population. (See Table 5.1-11.)

5.2.1 Rio Blanco County Households

In 1980, Rio Blanco County had 2,104 households and an average of 2.86 persons per household, slightly higher than the average household size for the state of Colorado, but much less than the average for Utah. The town of Rangely had 700 households and an average household size of 3.1 persons. (See Tables 5.1-5 and 5.1-12.)

5.2.2 Growth Projections

The town of Rangely is expected to grow rapidly in the next ten years if planned energy projects are undertaken. According to one forecast, population would grow from about 2,000 in 1980 to about 9,500 in 1990. This projection does not include growth from WRSP workers settling in Rangely. (See Table 5.1-13.)

Gibbs & Hill estimates that up to 24 percent of WRSP employees may reside in Rangely, Colorado. Permanent indirect population growth has been estimated at 3,824 in 1994. When WRSP-induced growth is added to those projections, a new population projection results. According to this projection, Gibbs & Hill estimates that Rangely's population could grow from 2,113 in 1980 to 12,890 in 1989 and could reach 13,275 by 1994. Using a multiplier of 1.5 for secondary employment growth, WRSP could account for 28.8 percent of Rangely's 1994 population. (See Table 5.1-14.)

Of the 3,824 persons which may be generated by WRSP, only 1,530 would be in the households of direct employees. The secondary WRSP population influx is estimated to account for the other 2,294 persons. The direct WRSP population could represent 12 percent of Rangely's population. (See Table 5.1-15.)

5.3 HISTORY OF ASHLEY VALLEY

There are three distinct cultures residing in Uintah County: the long-term residents, most of whom are descended from Morman settlers, the Ute Indians, and the newcomers. The long-term residents comprise the majority of the population. The newcomers are a small proportion of the population, but are expected to increase at a rapid rate if energy projects are developed as planned. The Utes comprise about 10 percent of the existing population.[2,17]

5.3.1 The Ute Indians

The Ute Indians were the first inhabitants of the present state of Utah, including Uintah County. In 1981, a reservation was established in the Uintah Basin. In 1980, the Ute reservation included 2.9 million acres in Uintah County. The Ute Indian population in Uintah County was 1,952 in 1980.[3] This amounted to 9.6 percent of Uintah county's total population.

The governing body of the Ute Tribe is a Business Committee composed of 6 members, elected to 4-year terms of office. The Bureau of Indian Affairs at Fort Duchesne reviews major Business Committee decisions and acts as an advisory board. A large share of the tribe's revenue comes from oil and gas. Their largest expenditure is for social services.

5.3.2 Long-Term Residents

In 1878, the Ashley Valley was settled by the Mormons and by 1890 much of the good agricultural land had been settled. Today, the Mormon culture is still a dominant force, with about 65 percent of the population associated with the Mormon faith.

In its origins, Mormonism was essentially agrarian. Agriculture was regarded as the proper base of the Mormon community and was considered the ideal way of life for the Mormon family. Until recently, the lack of large-scale industry left life consistent with such values.

The Mormons have always embraced a strong work ethic. Recreation is important to the Mormon community and is seen as support and refreshment for a more effective life.

5.3.3 Newcomers

The extraction, processing and distribution of oil shale, oil, natural gas and tar sands will require a large labor force. The size and composition of this labor force is examined in some detail in other sections of this report. The primary labor force will be made up of a large mixture of miners, truck drivers, heavy equipment operators, laborers and others, many of whom will be from outside Uintah County.

The lifestyles of many of these individuals will undoubtedly differ from those of the current long-term residents. For example, the very strong sense of community and common culture displayed by the long-term residents may not be the same among the newcomers.

5.4 HISTORY OF RANGELY, COLORADO

The town of Rangely began as a small trading post in the late 1800's and prospered as a way station for local sheep and cattle ranchers. However, the discovery of oil in the late 1930's and the increased demand for fossil fuels moved the community into a new era of mineral extraction. Although oil has taken the lead in the economy of the Rangely area, both cattle and sheep ranching remain important parts of the economic life of the community.

Rangely lies in an area of wide open spaces and has almost limitless potential for population growth and industrial development. Although small, the town of Rangely has all the essential features necessary to supply the wants and needs of those in the community.[8]

5.5 ATTITUDES TOWARD AREA DEVELOPMENT

Surveys carried out in the Uintah Basin[3,4] revealed that an overwhelming majority of residents (about 80 percent) approved, in principle, of oil shale development in the area. The positive economic impacts anticipated from such development outweighed expected problems. Almost all residents placed particularly high value on two seemingly incompatible goals: economic growth and preservation of a "rural" lifestyle. About two-thirds of the respondents felt that the latter could be satisfactorily maintained, provided growth was properly planned and controlled, and did not occur too rapidly. Even if new growth causes "moderate" increases in local taxes, a majority of those surveyed still approved of growth.

Of those surveyed in the Vernal area, slightly under two-thirds were Mormon. Logan, et al., point out certain areas in which some adverse impacts on the traditional cultural values of long-time Mormon residents may be expected.[3] These include the traditional Mormon emphasis on family life, educational attainment, law and order, a strong local government, and freedom from excessive "external" influences.

The surveys clearly revealed different emphases in the attitudes towards growth between subgroups of the population. Although, as may be expected, the younger, non-Mormon, recent in-migrants to the area tend to be most positive in their support of new energy-related growth, it is significant that a majority of the older, long-established Mormon population also favor such growth, though with more concern about its impacts on their traditional lifestyle.

TABLE 5.1-1

UINTAH COUNTY POPULATION -
1950, 1960, 1970 AND 1980

Year	Population	Average Annual Increase[3] Number	Percent[4]
1950[1]	10,300	--	--
1960[1]	11,582	128	1.24
1970[1]	12,479	90	0.77
1980[2]	20,247	777	6.22

---

1. Statistics as found in Comprehensive Plan, Vernal City, Utah, Uintah County - Vernal City Planning Commission, July 1970.
2. 1980 Census of Population and Housing. US Department of Commerce, Bureau of the Census.
3. Previous decade.
4. Number as a percent of previous population; i.e., not compounded annually.

Source: Gibbs & Hill, Inc.

TABLE 5.1-2

ASHLEY VALLEY POPULATION[3]-
1950, 1960, 1970 AND 1980

Year	Population	Average Annual Increase	
		Number	Percent
1950[1]	6,695	--	--
1960[1]	8,397	170	2.54
1970[1]	9,489	109	1.30
1980[2]	16,168	668	7.04

---

1. Statistics as found in Comprehensive Plan, Vernal City, Utah, Uintah County - Vernal City Planning Commission, July 1970.
2. 1980 Census of Population and Housing. US Department of Commerce, Bureau of the Census.
3. Ashley Valley is defined as Vernal Division in the 1980 Census data.

Source: Gibbs & Hill, Inc.

TABLE 5.1-3

UINTAH COUNTY AND ASHLEY VALLEY POPULATION - 1950, 1960, 1970 AND 1980

	1950[1]	1960[1]	1970[1]	1980[2]
UINTAH COUNTY	10,300	11,582	12,479	20,247
ASHLEY VALLEY	6,695	8,397	9,489	16,168
Percent	65	73	76	80
OTHER THAN ASHLEY VALLEY	3,605	3,185	2,990	4,049
Percent	35	27	24	20

---

1. Statistics as found in Comprehensive Plan, Vernal City, Utah, Uintah County - Vernal City Planning Commission, July 1970.
2. 1980 Census of Population and Housing. US Department of Commerce, Bureau of the Census.

Source: Gibbs & Hill, Inc.

TABLE 5.1-4

ASHLEY VALLEY AND VERNAL POPULATION -
1950, 1960, 1970 AND 1980

	1950	1960	1970	1980[2]
ASHLEY VALLEY[1]	6,695	8,397	9,489	16,168
VERNAL CITY	2,845	3,655	3,908[3]	6,600
Percent	42	44	41.2	40.8
OTHER THAN VERNAL CITY	3,850	4,742	5,581	9,568
Percent	58	56	58.8	59.2

---

1. Comprehensive Plan, Vernal City, Utah, Uintah County - Vernal City Planning Commission, July 1970.
2. 1980 Census of Population and Housing, US Department of Commerce, Bureau of the Census.
3. Uintah Basin Development Plan. Uintah Basin Association of Governments, July 1980.

Source: Gibbs & Hill, Inc.

TABLE 5.1-5

1980 HOUSEHOLD SIZE IN UTAH, UINTAH COUNTY, ASHLEY VALLEY AND VERNAL

	Utah	Uintah County	Ashley Valley	Vernal
POPULATION	1,461,037	20,247	16,168	6,600
HOUSEHOLDS	456,574	5,886	4,841	2,185
PERSONS PER HOUSEHOLD	3.2	3.44	3.34	3.02

Source: 1980 Census of Population and Housing. U.S. Department of Commerce, Bureau of the Census.

TABLE 5.1-6

UINTAH COUNTY AND UTAH POPULATION AGE AND SEX DISTRIBUTION, 1979

Age	Uintah County[1] Male	Percent	Female	Percent	Total Percent	Utah Total[2] Percent
0-9	2,021	11.2	1,985	11.0	22.2	23.0
10-19	2,007	11.1	1,928	10.7	21.8	18.1
20-29	1,454	8.0	1,551	8.5	17.5	19.9
30-39	1,171	6.5	1,141	6.2	12.7	12.7
40-49	895	4.9	862	4.8	9.7	8.3
50-59	772	4.3	736	4.1	8.4	7.4
60-69	446	2.5	456	2.5	5.0	
70+	317	1.7	376	2.0	3.7	10.7
SUBTOTAL	9,092	50.2	9,008	49.8	100.0	100.0
TOTAL (Male and Female)		18,100				

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1. Utah Department of Employment Security and Uintah Basin Association of Governments.
2. 1980 data from US Census.

Source: Gibbs & Hill, Inc.

TABLE 5.1-7

UINTAH COUNTY POPULATION PROJECTIONS, HIGH-GROWTH ASSUMPTION - 1980, 1985, 1990 AND 1994[1]

Year	Population	Labor Force	Households	Schoolchildren
1980[2]	20,247	8,400	5,886	5,429
1985[3]	30,843	14,158	10,200	7,739
1990[3]	54,439	24,760	19,300	12,887
1994[3]	44,965	21,128	14,795	10,911

---

1. See Appendix C for derivation, especially Table C-7
2. US Census
3. Gibbs & Hill Estimates

Source: Gibbs & Hill, Inc.

TABLE 5.1-8

ASHLEY VALLEY POPULATION PROJECTIONS, HIGH-GROWTH ASSUMPTION - 1980, 1985, 1990 AND 1994[1]

Year	Population	Labor Force	Households
1980[2]	16,008	6,748	4,653
1985[3]	22,877	9,903	6,825
1990[3]	40,469	17,355	13,107
1994[3]	34,997	16,447	11,517

---

1. See Appendix C for derivation and details, especially Table C-10
2. US Census
3. Gibbs & Hill estimates

Source: Gibbs & Hill, Inc.

TABLE 5.1-9

UINTAH COUNTY POPULATION GROWTH COMPOSITION, 1994

	Population	Index of 1980 Population
POPULATION IN 1980	20,247	1.00
BASELINE GROWTH, 1980 - 1994[1]	3,822	.19
Subtotal, Baseline Projection, 1994[1]	24,069	1.19
WRSP-INDUCED GROWTH[2]	12,099	.60
OTHER ENERGY PROJECTS[3]	8,797	.43
Subtotal, Energy-induced Growth[4]	20,896	1.03
TOTAL[5]	44,965	2.22

---

1. See Table C-6
2. 0.579 of all energy growth; compare Tables C-1, C-7, and D-5. Note total in Tables D-5 and D-6 is slightly different (12, 111) due to rounding
3. 0.421 of all energy growth
4. Table C-5; WRSP and other growth is allocated in proportion to direct employment
5. Table C-7

Source: Gibbs & Hill, Inc.

TABLE 5.1-10

WRSP-INDUCED POPULATION GROWTH IN UINTAH COUNTY, 1994

	Number	Index All Growth	Index 1994 Population
WRSP DIRECT POPULATION	4,840	.196	.11
WRSP INDIRECT POPULATION	7,259	.294	.16
WRSP TOTAL POPULATION[1]	12,099	.489	.27
All Growth[2]	24,718	1.00	.55
Total 1994 Population[1]	44,965	-	1.00

---

1. See Table 5.1-9 and Table D-5
2. Table 5.1-9

TABLE 5.1-11

RIO BLANCO COUNTY
AND RANGELY POPULATION -
1960, 1970, and 1980

	1960[1]	Percent Increase[3] 1960-70	1970[2]	Percent Increase[3] 1970-80	1980[2]
RIO BLANCO COUNTY	5,150	-0.6	4,842	2.9	6,255
RANGELY	1,464	.87	1,591	3.3	2,113
Percent	28.4		32.8		33.8
OTHER THAN RANGELY	3,686	-1.2	3,251	2.7	4,142
Percent	71.6		67.2		66.2

---

1. Socio-Economic Environmental Assessment for the Proposed Deseret Generation and Transmission Cooperative Moon Lake Project; Burns and McDonnel, 1979.
2. 1980 Census of Population and Housing. US Department of Commerce, Bureau of the Census.
3. Average annual increase.

TABLE 5.1-12

1980 POPULATION, HOUSEHOLDS, AND HOUSEHOLD SIZE
IN COLORADO, RIO BLANCO COUNTY AND RANGELY

	Persons	Households	Household Size
COLORADO	2,814,442	1,060,822	2.65
RIO BLANCO COUNTY	6,023	2,014	2.86
RANGELY	2,119	700	3.10

Source: 1980 Census of Population and Housing. US Department of Commerce, Bureau of the Census.

TABLE 5.1-13

RANGELY POPULATION PROJECTIONS -
1980, 1985, 1990, 1995, AND 2000

Year	Population	Average Annual Increase	
		Number	Percent
1980	2,026	-	-
1985	6,826	960	47.4
1990	9,539	543	7.9
1995	9,428	-22	-0.2
2000	9,774	60	0.7

Source: Colorado Western Council of Government, Rifle, Colorado, April, 1981.

TABLE 5.1-14

PROJECTED RANGELY POPULATION WITH WRSP IMPACT - 1985, 1989, AND 1994

Year	WRSP Induced Population[1]	Rangely Population Projection[2]	Total Rangely Population Projection	Percent WRSP Population
1985	454	6826	7280	6.2
1989	3896	8994	12,890	30.2
1994	3824	9451	13,275	28.8

---

1. Gibbs & Hill estimates.
2. Colorado Western COG projections, April 1981; also see Appendix D.

Source: Gibbs & Hill, Inc.

TABLE 5.1-15

WRSP-INDUCED POPULATION GROWTH IN RANGELY,*
1994

	Number	Index All Growth	Index 1994 Population
WRSP DIRECT	1,530	.14	.12
WRSP INDIRECT	2,294	.21	.17
WRSP TOTAL	3,824	.35	.29
ALL GROWTH	11,162	1.00	.84
TOTAL 1994 POPULATION	13,275	-	1.00

---

* See Appendix D for derivation.

Source: Gibbs & Hill, Inc.

REFERENCES - SECTION 5.0

1. Utah State Planning Coordinator's Office, Energy 2000. The Impacts of Energy Development in Eastern Utah, November, 1980.

2. Colorado Census Bureau, Ms. G. Valdez, telephone conversations, June 29 and July 8, 1981.

3. Uintah Basin Association of Governments, Uintah Basin Development Plan, July, 1980.

4. Burns and McDonnell, Socio-Economic Environmental Assessment for the Proposed Deseret Generation and Transmission Cooperative Moon Lake Project, 1979.

5. Uintah Basin Association of Governments and APA Planning and Research, Uintah Basin Oil Shale Impact Study, Interim Report, July, 1980.

6. Uintah County - Vernal City Planning Commission, Comprehensive Plan Vernal City, Utah, July, 1970.

7. United States Department of Commerce, Bureau of the Census, 1980 Census of Population and Housing.

8. "Welcome to Rangely," Rangely Area Chamber of Commerce, Colorado Printing Company.

6.0 WRSP CONSTRUCTION CAMP

6.1 SITE SELECTION

A limited site selection study was carried out to identify and evaluate the relative suitabilities of several potential sites in the WRSP project area for the worker housing campsite.

The approach used resulted in an objective and orderly comparison of the relative advantages and disadvantages of the candidate sites. A numerical rating and ranking system was used. A summary matrix chart was developed which sets forth the parameters and evaluation criteria on a comparative basis, collectively, for all sites.

6.1.1 Study Area Definition

The study area was defined based upon projected air quality isopleths and traditional topographic analysis techniques. Sulfur dioxide concentrations from the facility were estimated and an appropriate exclusion area was defined. The need to avoid land areas required in extracting or processing, including spent shale disposal and storage, dictated that other areas on the lease tracts be excluded from the study area as well. The need for accessibility from existing access to the tracts via Route 45 excluded on-tract areas west of the process area from further consideration.

It was agreed that the study area off-tract would not extend beyond Little Bonanza to the north. The east-west crossroad leading to the Uintah-Ouray Indian Reservation, and ultimately to Highway 64, was considered sufficient access to extend the study area along these routes for a distance of several miles.

6.1.2 Evaluation Methodology

Twelve parameters were identified as appropriate for evaluating the characteristics of candidate locations for WRSP campsite development. The twelve parameters were arranged into three groups and assigned their relative importance:

Group One: The parameters of major importance. These assigned parameters were 65 percent of the total points possible.

Group Two: The parameters having sufficient impact on site feasibility, but at a lesser level. These parameters were assigned 25 percent of the total points possible.

Group Three: The parameters of considerably less significance than the other two groups. These parameters were assigned the remaining 10 percent of the total points possible.

Within each group, the parameters were ranked in order of relative importance and percentages were assigned to reflect this relative importance. Total point score possible for any single site was 100. Following are the parameters by percentage group and total point score possibilities.

Group	Parameters	Points
I (65%)	Land Area	18
	Land Ownership	15
	Proximity to Process Area	13
	Accessibility to Route 45	11
	Environmental Acceptability	8
II (25%)	Water Availability	8
	Topographic Suitability	7
	Soils Suitability	5
	Power Availability	5
III (10%)	Regulatory Acceptability	5
	Site Amenities	3
	Slope Orientation	2
	Total	100

6.1.3 Identification of Candidate WRSP Campsite Locations

Quadrangle maps at a scale of 1:24,000 available from the USGS, topographic maps, and steroscopic aerial photographs provided by VTN Consolidated, Inc., formed the data base for initial identification of potential sites for campsite development. Sites were identified as areas of suitable topography and size. These preliminary selection criteria were used in lieu of a more detailed process due to the limited scope of this study.

Eleven potential sites were identified as candidates for evaluation. These included five on-tract and six off-tract sites.

6.1.4 Evaluation of Candidate Sites

The sites were evaluated by both field inspection and map analysis. A field visit was performed to evaluate accessibility from Route 45, suitability of topography for development, environmental acceptability, and site amenities.

Subjective evaluation of such factors as proximity to process area, ownership of land, availability of water and power, and regulatory acceptability was performed by Gibbs & Hill. Relative numerical scores were assigned to reflect these evaluations. Environmental acceptability was determined by limited evaluation of general ecosystem type. Since the ecosystem for all sites was the same, there were no scoring differences on this basis among the sites.

No candidate sites failed to satisfy the twelve requirements, but each candidate site showed certain strengths and weaknesses based upon general analytical findings. The relative advantage of one site over another will prove largely to be a function of specific WRSP project needs.

6.2 WRSP CAMPSITE

This section describes the method used in projecting housing facility requirements to accommodate WRSP's temporary, single-status workforce at the Campsite and sets forth the requirements program for the Campsite by project phase.

The analysis assumes that all WRSP single-status construction workers will be housed at the Campsite.

6.2.1 Housing and Facility Requirements

Construction camps, consisting of a bachelor camp and a recreational vehicle camp, will be built in the northern portion of Tract Ub, several miles from the construction site. The bachelor camp will consist of modular, transportable bachelor units, recreational facilities, service facilities (e.g., laundromat, banking facility, mail facility, and indoor entertainment), and central mess hall, a sewage treatment plant, power plant and electrical substation. The Phase I bachelor camp will be expanded to accommodate the workforce requirements of Phases II and III.

The recreational vehicle camp will consist of RV living units, a central outdoor recreational area and satellite recreational and service facilities, a sewage treatment plant, and power plant and substation. The Phase I RV camp will also be expanded to accommodate the workforce requirements in Phases II and III.

In developing a site plan, space allowances will be made to accommodate building additions. The Campsite should have an adequate provision of outdoor sporting and recreational facilities to meet employee recreation needs. The land area calculations have included space for basketball, tennis, and softball. These sports were chosen as representative of the recreation interests of a single bachelor population. Again, since requirements will vary greatly for each phase of the project, facilities should be sized and constructed in three phases, based upon the peak needs of each phase.

Space need planning for community facilities could be keyed to the three development phases. Buildings could be of modular construction to allow for a Phase I initial construction, Phase II additions, and Phase III removals, if desirable.

6.2.2 Aggregate Land Area Needs

Space requirements for housing, community centers, outdoor recreation, utilities, and open spaces were aggregated to give a total land area requirement for the Campsite by development phase.

Based on the analysis, WRSP land area requirements for the Campsite by phase are as follows:

- Phase I: 85 acres
- Phase II: 120 acres
- Phase III: 166 acres

6.3 IMPACT ON LOCAL COMMUNITIES

The construction camp workforce will be residing about 50 miles from the Ashley Valley, and will have all necessities provided at the camp. With overtime, training, and onsite recreational opportunites, camp residents will have little need to go offsite except to make occasional offsite visits for relaxation and shopping.

6.3.1 Socioeconomic and Fiscal Impacts

The economic impact of camp residents will be felt by the purchases of goods and services they make in the Ashley Valley. As the largest urban recreation and shopping area within an hour's drive of the camp, the Ashley Valley will probably attract a portion of the retail purchases made by camp residents. Some of the camp supplies may also come from the Ashley Valley and Rangely. The average annual impact is conservatively estimated at approximately $400,000 in sales over the 11 construction years, 1982 to 1992. (See Table 6.3.1-1.)

Local fiscal impacts will include an increase in property and sales tax receipts. On the debt side will be a marginal increase in county and municipal services, such as road, police, and fire, during the construction period.

The camp will be a fiscal benefit to the county and school district. The property tax on the construction camp is expected to yield about $400,000 per year. Sales tax impact is estimated at an average of $3,000 per year. (See Table 6.3.1-2.) This figure is a conservative estimate of sales tax generated only from the construction workers' individual personal expenditures and does not include the major company supply purchases which will be made in support of the construction camp.

6.3.2 Impacts on Public Facilities and Infrastructure

Because of the campsite's remote location and distance from the public facilities and Ashley Valley's infrastructure, impacts to most public facilities and infrastructure will be marginal.

6.3.2.1 Police Protection

The campsite is too distant from the Ashley Valley to provide an acceptable response time to emergency situations. It is likely that police protection at the construction camp would be provided by a private or company security force, with an option of assistance by state and county police when needed.

6.3.2.2 Fire Protection

As is the case for police protection, the camp is too remote to provide adequate response time from the Ashley Valley. Fire protection should be provided internally by WRSP.

6.3.2.3 Medical Facilities

It is expected that the majority of acute medical cases among construction workers would be treated at the Uintah County Hospital in Vernal. An addition of one to two doctors practicing in the Ashley Valley would be desirable during the campsite's peak year of impact. The Campsite will probably have a medical facility as well.

TABLE 6.3.1-1

ECONOMIC IMPACT OF WRSP CONSTRUCTION CAMP *

PERSON-YEARS OF LABOR REQUIRED FROM CAMP RESIDENTS	8,460
CONSTRUCTION PERIOD	11 Years
AVERAGE ANNUAL CONSTRUCTION FORCE	705
AVERAGE ANNUAL WAGE	$24,000
AVERAGE ANNUAL PAYROLL	$16,920,000
RETAIL SALES @ 50%	$8,460,000
PROPORTION OF SALES ALLOCATED TO ASHLEY VALLEY	0.05
SALES ALLOCATED TO ASHLEY VALLEY	$423,000
TOTAL - 11 YEARS	$4,653,000

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* In 1980 dollars

Source: Gibbs & Hill, Inc.

TABLE 6.3.1-2

FISCAL IMPACT OF CONSTRUCTION CAMP
DURING PEAK YEARS, 1988-1994

SALES TAX	
Retail Sales in Ashley Valley	$423,000
Local Share of Sales Tax	0.0075
Sales Tax	$3,173[1]
PROPERTY TAX	
Construction Cost	$32,300,000[2]
Ratio Assessed to Market Value	0.2
Assessed Value	$6,460,000
County Rate	0.0118
County Tax	$76,228
School District Rate	0.0450
School Tax	$290,700
Sum of County and School Tax	$366,928
Total:	$370,101

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1. Sales tax includes only personal purchases by workers and does not include major supply purchases made by the company in support of the construction camp.
2. Assumes average unit cost of $20,000 (1981 dollars) for 1,615 units

Source: Gibbs & Hill, Inc.

REFERENCES - SECTION 6.0

1. Housing density standards based on the following sources:

   a. Briscoe, Maphis, Murray and Lamont, Inc., June 1978. Action Handbook for Small Communities Facing Rapid Growth, Boulder, Colorado.

   b. Colorado West Area Council of Governments, 1974. Oil Shale and the Future of a Region; Garfield, Mesa and Rio Blanco Counties, Colorado, a Summary Report.

   c. Quality Development Associates, Inc., 1978, Development Guides for Meeker and Rifle, prepared for C-b Oil Shale Project, Colorado.

   d. Conklin and Rossant, 1974. Off-Site Oil Shale Urbanization Projections and Their Environmental Impact, New York.

   e. Gibbs & Hill, Inc., 1977. ARAMCO Community Services: Five Year Development Plan, New York.

2. Community facilities standards based on:

   a. Briscoe, Maphis, Murray, and Lamont (n.d.), Energy Impact Source Book for Rural Communities, which cited National Parks and Recreational Standards in Draft Garfield County Capital Improvements Plan.

   b. Holleran Services, Inc., A Brief Outline of Construction Housing and Related Services Provided by Holleran Services, Inc., Laguna Hills, California.

7.0 POTENTIAL COMMUNITY IMPACTS

This section discusses the potential impacts on Ashley Valley and Rangely, Colorado, resulting from the projected increase in jobs and population induced by the White River Shale Project (WRSP). It sets forth the projected land, housing, facility, service, and infrastructure needs of the WRSP project, based on the number of direct employees and their dependents who are projected to reside in Ashley Valley and Rangely. Table 7.0-1 presents the WRSP direct and indirect population projections, along with estimates of the WRSP population's settlement distribution between Ashley Valley and Rangely.

Included in this section are the derivation and application of standards, and the projected needs for WRSP based on those standards. Results are presented in summary form by project phase in this section and complete tabulation by year for 1982 through 1994 are presented in Appendices A and B.

7.1 NEEDS OF THE WRSP-INDUCED POPULATION

The development of the WRSP housing and community needs projections for the Ashley Valley was based on the employment schedules and population projections described in previous sections of this document, and the formulation of reasonable development standards for a wide range of housing types and community support facilities.

WRSP will be employing a large number of operating and construction personnel from 1982 through 1994. A major portion of the WRSP operating workforce is expected to reside in Ashley Valley.

The socioeconomic profiles of the workers residing at the camp (and consequently, the housing and community facility needs to be met there) are different from those to be met in Ashley Valley. Gibbs

& Hill developed a list of housing types and community facility needs which reflect characteristics and requirements of the location and are generally comparable to housing and community facility provisions found in other, similar, energy-impacted areas.

In order to derive appropriate planning standards for WRSP, Gibbs & Hill researched past efforts by other consultants, collected field data on existing facility usage, and made comparisons with other planning ratios for comparable conditions. Existing conditions, the existing ratio, comparable standards currently used for other Western projects with a similar development context, and nationally accepted published standards were compared in order to formulate a proposed ratio for each facility. The lists of the facilities and the proposed standards for each are presented in Table 7.1-1. The detailed derivation of these standards is shown in Appendix A.

WRSP housing and community facility needs, computed from the population projections and proposed standards, were determined for the Ashley Valley from 1982 through 1994. This data is summarized in Table 7.1-2 and is presented in complete form in Appendix B.

7.1.1 WRSP Land Area Needs - Ashley Valley

Total peak land area needs for accommodating the Ashley Valley WRSP-induced population are as follows:

- Phase I (1981-1985): 199 acres
- Phase II (1986-1989): 768 acres
- Phase III (1990-1994): 791 acres

The peak land demand for housing and all other facilities in the Ashley Valley will occur in 1991, when 791 acres will be needed. The average annual needs during each Phase vary widely, being lowest in the initial

project start-up stages, increasing sharply in Phase II and leveling off and gradually declining during Phase III. (See Table 7.1-2.)

Total WRSP Land Area needs are distributed by facility type and land use as follows:

Use	Percent of Total WRSP Land Requirements
Housing	70.8%
Schools	6.0%
Community Facilities	0.5%
Recreation	9.5%
Commercial/Industrial	12.8%
Utilities	0.3%
	100.0%

These percentages were calculated for Phase III Average; percentages vary slightly for each project year.

7.1.1.1 Housing

Housing for WRSP direct population (employees and their families) will consume the largest proportion of the WRSP land needs. The maximum residential land needs in the Ashley Valley for WRSP direct population will occur in the tenth project year (1991), when 392 acres will be needed for all residential land uses. Land needs are much lower in earlier years (1982-1986). Land area needs in 1993 will be 282 acres and in 1994, 309 acres. Land needs in 1994 are for operating personnel and their families, exclusively, and are expected to remain constant thereafter.

Housing needs for WRSP indirect population (secondary employees and families) are as follows:

	Units	Acres
1985	60	7
1989	1237	114
1994	1401	129

7.1.1.2 Schools

Education facilities will require a relatively small proportion of the WRSP land needs, about 6 percent of the total. Approximately 35 acres will be needed for WRSP direct population during the peak year, which occurs in 1989. However, it is unrealistic to plan public facilities for a peak period of relatively short duration. The average of the five years of greatest impact provides a better basis for sizing facilities. For schools, the average for Phase III, the period of greatest impact is 26 acres. WRSP's indirect population will require 3 acres in 1985, 35 acres in 1989, and 38 acres in 1994 for schools. Thus, the total peak need for WRSP direct and indirect will be approximately 73 acres.

7.1.1.3 Community Facilities

Community facilities (medical facilities, police and fire protection, and the library) will require a minimal amount of land - less than 1 percent of the total land needs. During the peak year, only about 3 acres will be needed for incremental additions to medical, library, police, and fire protection facilities.

7.1.1.4 Recreation

WRSP's incoming population will require about 55 acres of recreational land during the peak year. This is approximately 10 percent of the projected land needs. The average of the five years of greatest demand is 52 acres. When planning recreational facilities and open space acquisition, acreage requirements will be based on aggregate population increases, rather than on WRSP's share only.

7.1.1.5 Utilities

The land areas calculated for utilities are minimal, ranging from 0.08 acres in 1981 to 3.1 acres in 1989.

Not incorporated into these figures is the land area for the new Ashley Valley wastewater treatment facility, which is discussed in Section 3.0.

7.1.2 WRSP Public Employment Needs

Employment needs in this context comprise public service employment additions which may be needed to provide and maintain adequate community facility service levels to supply the increment in population attributed to WRSP-generated employment. Among the facilities which may experience service employment needs are schools, hospitals, library and police and fire protection facilities.

The number of employees needed for each of these facilities tends to vary widely by project phase and by year. Therefore, it may be unrealistic to plan personnel additions which precisely match the needs. It would be more practical to plan manpower additions using average requirements over a period of several years, which would tend to smooth out the yearly fluctuations. A program of temporary hiring might be used to mitigate any sharp uptrends in employment needs over relatively short periods. It can be expected that, when included in aggregate population increases in the Ashley Valley, the yearly variations of WRSP needs will become less important as a planning factor.

7.1.3 WRSP-Induced Public Equipment and Facility Needs

Service levels and space needs at several of the facilities included in the WRSP needs analysis were measured in terms of equipment needs and facility needs. Equipment needs consisted of library books, police vehicles, and fire fighting vehicles. Facility needs consisted of classrooms needed for schools, and hospital beds. The WRSP program requirements, by phase, are presented in Table 7.1-4.

As is the case with the service employment needs, equipment and facility needs vary widely by phase. In planning for equipment purchase and facility additions, average needs and aggregate needs should be the guiding considerations.

7.1.4 WRSP Utility Needs

Utility flows by phase are summarized in Table 7.1-5. The flow rates for water and wastewater, in million gallons per day (MGD), are reasonable estimates of the daily demands on the water distribution and wastewater collection networks. New wastewater collection and treatment facilities are being constructed in the Ashley Valley and improvements to the water supply network have been proposed. These are discussed in Section 7.3.

7.2 POTENTIAL WRSP PROPERTIES DEVELOPMENT

Based on a peak Ashley Valley population for WRSP direct employees and dependents of 5,800 persons, and an average family household size of 3.2, Gibbs & Hill estimates that there will be about 1,890 WRSP households at peak year. By 1994 this is expected to decline to 1,540 households. The WRSP indirect population impact will add 3,452 persons to Ashley Valley in 1989 and 3,739 persons by 1984. With an average family size of 3.2, this will add approximately 1,200 households to Ashley Valley.

The equivalent residential land area needs, assuming an average density of about 5 du/acre, are 387 acres (peak year) and 308 acres (final year). Gross land area needs are estimated to be 557 acres and 475 acres, respectively.

WRSP has acquired three parcels, about 6 miles southeast of Vernal along Route 40, with a total gross area of 727 acres. The choice of this

location was based on an assessment of current growth, taking into account existing and proposed access and utility services. The area in which WRSP's site is located is expected to show the most rapid growth of any area outside the present Vernal City Growth Boundary. This is expected because of the direction of planned sewer and water expansions, and the site's strategic location between Route 40 and the proposed new road to Bonanza. (See Figures 7.1 and 7.2.)

Based on physical characteristics of WRSP's site, and an assumed mix of housing types based on typical worker preferences (see Table 7.2-1), Gibbs & Hill has estimated the maximum holding capacity of the WRSP properties as 2,040 units (6,540 persons at 3.2 persons/household and one household per unit). The existing property, then, could accommodate all of WRSP's Ashley Valley population in the peak year.

WRSP, therefore, has considerable flexibility in how it chooses to accommodate its employees and their dependents in the Vernal area. The primary consideration may prove to be WRSP's desire to avoid creating a "company town" image, and to minimize the negative impacts which might be associated with creating a WRSP "enclave" in the Vernal area.

To further this objective, WRSP may accommodate only a portion of its total housing need on its present Vernal area properties. WRSP might develop and sell some portion of the total units built on its property to non-WRSP families; or portions of their present holding might be sold to other developers in accordance with an overall development plan for the site.

The precise number of units ultimately to be developed for WRSP use on their present site probably should not be determined immediately. A

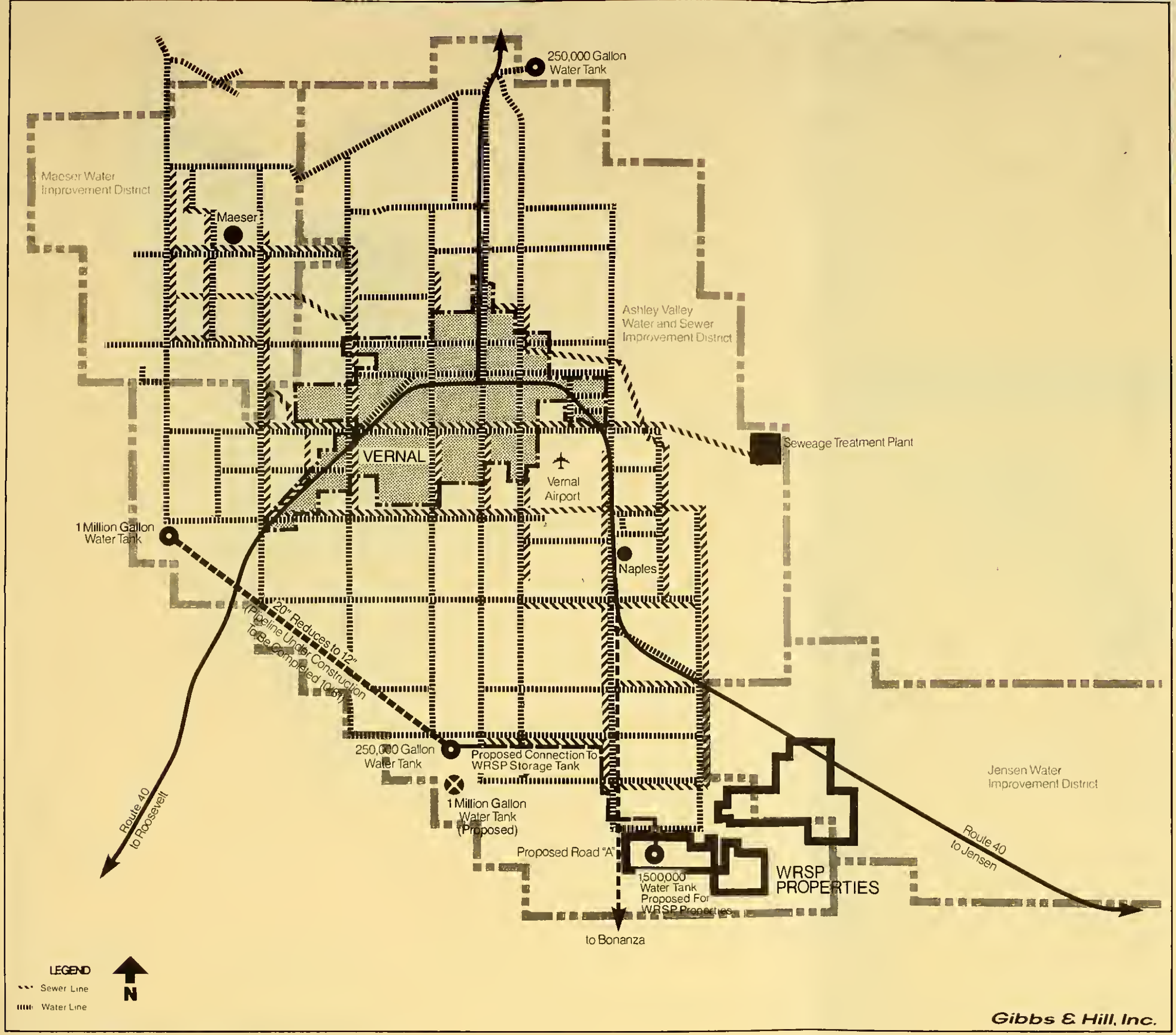

Figure 7.1 Proposed Sewer and Water Extensions, 1995

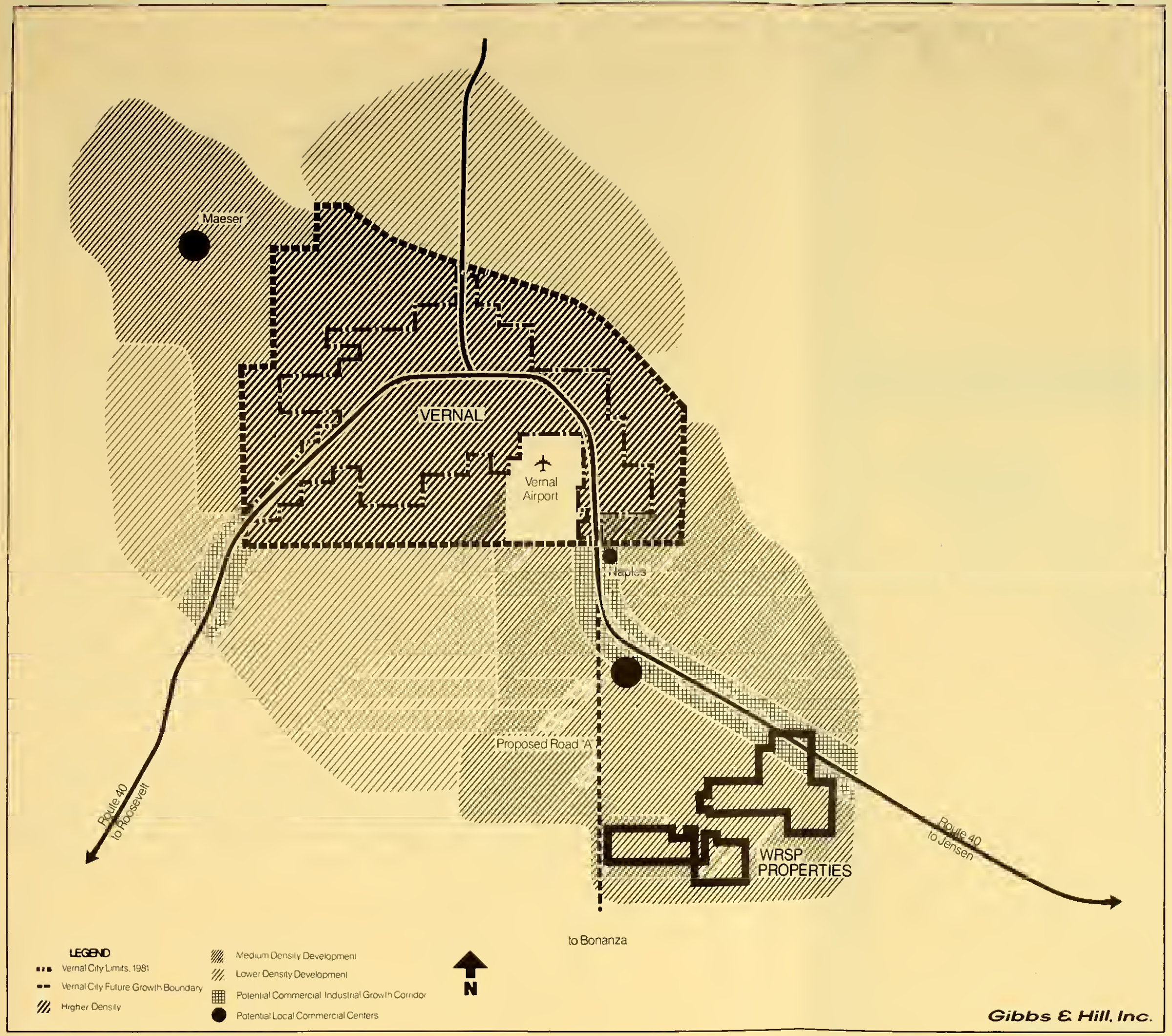

Figure 7.2 Conceptual Growth Pattern

first phase program can be established to meet the immediate WRSP needs related to the Demonstration Phase of the oil shale project. Plans for later phase development should evolve in a manner consistent with actual WRSP-generated housing demand, and reflecting actual water and sewer capacities at the various development sites. In addition, such a step-by-step process will ensure that WRSP's ultimate development will be consistent with local zoning and land use policies which are currently being formulated by the City and County governments.

7.3 IMPACTS ON ASHLEY VALLEY

A major portion of WRSP-induced population has been projected to settle within the Ashley Valley area. This section addresses the potential impacts of that settlement on the Ashley Valley.

7.3.1 Economic and Fiscal Impacts

Economic growth is expected to be very rapid. During construction, the combined construction and operation payroll is expected to rise quickly and surpass the final operation level early in 1988. Between 1988 and 1991, combined payrolls are expected to reach a plateau at about 5,000 jobs or 150 percent of permanent levels. After 1994, when construction has ended, the payroll will drop back to 3,353 jobs. (For details, see Table D-1, Appendix D.)

By 1994, the project will have a permanent payroll of $70 million in 1980 dollars, distributed among 3,353 direct employees. When secondary jobs are included, the total impact is expected to be an increase of $133.8 million in earnings and jobs in the region (see Tables 7.3.1-1, 7.3.1-2, and 7.3.1-3).

The lion's share of this economic boom, estimated at over three-fourths of the total earnings and jobs, is expected to be directed to current and new residents of the Ashley Valley. The infusion of a substantial operations and construction payroll will enhance the local economy. At full operation in 1994, the total increase in earnings in Uintah County would be $102.5 million in 1980 dollars. These payrolls would represent an increase of 76 percent above 1979 earnings for the residents of the County. (See Table 7.3.1-2.)

Since earnings are used to provide new jobs, the employment impact follows from the earnings impact. However, the jobs in the non-basic economy, such as retail trade and services, are not as highly paid as the relatively skilled construction and operation jobs. The employment multiplier is therefore always higher than the earnings multiplier, because more people in proportion are required to fill these secondary jobs. Of the 3,353 WRSP employees, it is expected that 2,568, or approximately 76 percent, will reside in Ashley Valley. The employment multiplier is about 1.5. These new direct jobs will generate another 3,789 non-basic jobs in the Ashley Valley. Total permanent impact is, therefore, 6,357 jobs. This would more than double the current Ashley Valley labor force. (See Table 7.3.1-2.)

The WRSP will add substantially to the tax base in Uintah County. County government and the school district will benefit directly from property tax revenues. Mechanisms will be required to enable districts and municipalities to also benefit directly. All units of government will benefit from increases in sales tax and other population-related revenue sources. The WRSP-induced population will generate increased school and community operating costs. New facilities -- schools, roads, etc. -- will also be needed for the increased population.

The long-term impact of all growth is expected to be positive. WRSP induced growth represents a major portion of the total growth, with

a substantial increase in the tax base. It is also expected that revenues will outweigh costs in the long run (for further discussion, see Sections 4.2, 4.3 and 4.4).

7.3.2 Impacts on Public Facilities

This section discusses the adequacy of Ashley Valley's existing and planned community services, facilities, and infrastructure in terms of their ability to serve natural (baseline) population growth, WRSP-induced growth, and aggregate growth resulting from six energy projects in this study. This is done in accordance with the following:

- Baseline population projections for 1985, 1989, and 1994.
- WRSP direct net population for 1985, 1989, and 1994.
- Cumulative population projection of all regional projects for 1985, 1989, and 1994.

The derivation of these population projections are presented in Appendix C.

7.3.2.1 Land Area Needs for Housing, Commercial and Industrial Uses

Based on an average of 3.44 persons/household and 4.7 dwelling units/acre, and Ashley Valley's 1980 population of approximately 16,000 residents, about 990 acres currently are devoted to residential use. This will increase to 1,090 acres in 1985, 1,152 acres in 1989, and 1,156 acres in 1994, according to baseline projections (see Table 7.3.2-1).

If the WRSP project is built, requirements for WRSP-direct residential land will be 80 acres in 1985, 387 acres in 1989, and 309 acres in 1994.

WRSP direct households will require 370 housing units in 1985, 1,823 housing units in 1989, and 1,537 units in 1994.

Land area needs for the WRSP indirect population will be 7 acres in 1985, 114 acres in 1989, and 129 acres in 1994. Residential units needed for the indirects would be 60 in 1985, 1,237 in 1989, and 1,401 in 1994.

If all projects are built, the Ashley Valley will need 6,825 housing units in 1985, 12,157 units in 1989, and 11,517 units in 1994. This housing will require 1,484 acres in 1985, 2,587 acres in 1989, and 2,303 acres in 1994.

The total residential land area need by 1989 would be 3,739 acres, which is considerably less than the 24,000 acres considered suitable for development in the Valley (see Section 3.1.1). The WRSP impact need would represent a fractional proportion of this total land need and the land area suitable for development.

The WRSP project will generate a need for 0.8 acres of commercial land in 1985, 5.1 acres in 1989, and 3.6 acres in 1994. Commercial land in this context is considered as land used for local and community retail activities. These acreage requirements indicate only a general propensity of increased land absorption for commercial use in Ashley Valley due to population increase, and do not represent a specific requirement for WRSP to meet. The same is true for industrial land consumption. In 1985, 10.5 acres will be needed for industrial use, 69.6 acres in 1989, and 49.6 acres in 1994. This represents potential land absorption for secondary industrial activity which would increase in the Ashley Valley due to the increase in population and overall economic activity. The WRSP indirect population may need 0.25 acres in 1985, 3.1 acres in 1989, and 3.3 acres in 1994 for community retail services. For industrial development, the indirect WRSP population may require 3.3 acres in 1985, 41.4 acres in 1989, and 44.9 acres in 1994.

In Section 7.1 industrial land requirements were split between light and heavy uses with 10 acres/1,000 population allocated in heavy industry and 2 acres/1,000 population allocated to light industry. These standards were developed by the Urban Land Institute and have been used in several studies regarding oil shale development impacts. These standards are most applicable to planning agencies when allocating industrial land reserves for zoning purposes. As applied to the Ashley Valley, however, a local influx of heavy industry due to the energy projects is not expected, and the overall land requirements for industrial acreage is probably overestimated.

7.3.2.2 Schools

Information on the impacts to the Uintah County School District is provided in Tables 7.3.2-4, 5, 6, and 7. This information is displayed for baseline growth, WRSP direct growth, and total projects' growth in terms of both absolute service, facility, and employment needs, and in terms of surpluses and deficits as measured against the existing provision of service.

In general, energy projects' growth will cause a significant impact to the Uintah County School District by 1985. The analysis was done for the final year of each WRSP project phase, 1985, 1989, and 1994. For some facilities and services, deficits will occur earlier than 1985. Service level deficits will occur when enrollments exceed capacity and teacher requirements. A shortage of school district owned land will occur by 1989. Isolating WRSP direct impacts, shortfalls in terms of teacher needs will occur by 1989 and the current problem of overcrowding will increase by 1985. It is estimated that WRSP will generate enrollment to require 1 additional school by 1985 and 3 schools by 1989, the peak project year. The permanent (post-1994) WRSP requirement is 2.4 schools.

7.3.2.2.1 *Land Area Impacts*

It appears that the Uintah County School District has available enough surplus land to meet the WRSP direct enrollment requirements during each project phase. However, substantial shortfalls will occur by 1989 when the cumulative impact of all projects is considered.

The Uintah County School District has a vacant land reserve of about 135 acres, located on scattered parcels mostly within the Ashley Valley. Normal growth needs for school property in the school district will be 136 acres by 1985, increasing to 144 acres by 1989, and remaining stable at 144 acres in 1994. Because of the large surplus of vacant school property, normal growth will require considerably less land than is available, with a remaining surplus of 122 acres in 1985, and 114 acres in 1989 and 1994.

The WRSP-direct population increment to normal growth is 3.8 percent of the baseline in 1985, 24.2 percent in 1989, and 17.2 percent in 1994. Land requirements for the WRSP component are 5 acres in 1985, 35 acres in 1989, and 25 acres in 1994, relatively small impacts considering the available reserve of 135 acres.

The cumulative impact of all projects is substantial. When the normal growth projection is added to the cumulative impact, a shortfall of 53 acres occurs by 1989, declining to a shortfall of 11 acres by 1994.

This analysis assumes that the entire school district land reserve is suitable for development in terms of physical capacity, parcel configuration, and location. None of the properties have been inspected for these constraints; however, a reasonable assumption is that less than the total 135 acres is developable. The school district should assess the option of trading parcels to create a land reserve with a high

proportion of developable acreage, with a suitable configuration for a school site plan, and located in the anticipated growth corridors.

7.3.2.2.2 *Enrollments and Facilities*

Currently, the Uintah County School District has a surplus of 2 teachers above the number required to maintain a teacher/pupil ratio of 1:25. Upon completion of a new elementary school in 1983, the school district will hire 18 more teachers.

WRSP and the other energy projects will create a substantial influx of school children to Uintah County. In 1989, WRSP's peak year, 1,169 WRSP-direct incoming students, 1,096 WRSP-indirect incoming students, and 6,110 total pupils from all the projects will enroll in Uintah County Schools. When baseline growth is added, the Uintah County School District may need to accommodate 12,500 pupils, a 138 percent increase above the current 1980-81 enrollment.

The Uintah County School District already experiences enrollments exceeding capacity. Even with an additional 600-pupil school scheduled to open by Fall 1983, serious shortfalls are anticipated. By 1985, the equivalent of 1.6 new schools will be required to meet baseline requirements, 0.4 school for WRSP-direct, and 3.5 schools for cumulative projects' growth (assuming a school size of 500 pupils). To meet anticipated growth at that time, plus erasing the present deficit, 5.1 new schools may be required. By 1989, the anticipated needs could be baseline, 2.3 schools; WRSP-direct, 2.4 schools and WRSP-indirect, 2 schools; cumulative projects, 12.3 schools; and total growth, 14.6 schools. Needs for 1994, somewhat less than the peak requirements, may be baseline, 2.3 schools; WRSP direct, 1.8 schools; cumulative projects, 9.3 schools; and total growth, 11.6 schools. WRSP and cumulative projects' needs are listed in the "recommended service level" column of Tables 7.3.2-5, 6, 7, and 8. This represents the actual impacts

attributable to the projects. The greatest pressure from growth probably will be at the elementary school level.[6]

7.3.2.2.3 *Teachers*

The corresponding needs for school faculty are likewise substantial. Under normal growth assumptions, the Uintah County School District may need a total of 241 teachers in 1985, 255 teachers in 1989, and 256 teachers in 1994. Upon completion of a new elementary school in 1983, the school district will hire 18 additional teachers. Above and beyond this hiring, the district may need 4 more teachers in 1985, 18 more teachers in 1989, and 19 additional teachers in 1994 to maintain the recommended teacher/pupil ratio.

7.3.2.2.4 *Overview of School Impacts*

Table 7.3.2-8 summarizes the projected school construction needs of the Uintah County School District during the next 15 years. The projections assume that school facilities will be utilized in the same manner as they are now. Should year-round school, double session, overcrowding of facilities, or other such means be employed, these estimated construction needs would be reduced. As shown in Table 7.3.2-8, with energy development occuring along with baseline growth, the Uintah County School District could require additional classroom space at all grade levels equivalent to nearly 12 new school buildings, 11 additional acres for school construction (in addition to the 135-acre land reserve now owned by the Uintah County School District), and 200 additional teachers by 1994. In terms of school buildings, approximately 85 percent of this demand would be created by all the energy-related projects, and 21 percent would be created by WRSP specifically. In terms of teachers, 90 percent of the demand would be created by all the population energy projects, of which 18 percent would be created by WRSP-direct population specifically.

The intermediate (short-term) "peak year" capital needs are probably best met with innovative techniques utilizing a smaller number of new schools more effectively, rather than additional new construction. Such techniques could include double sessions, year-round schools, or using modular building construction methods which would allow facilities to be moved from place to place depending on demand.[6]

7.3.2.3 Water Supply and Treatment

An ample supply of water exists within the valley between Ashley Springs and Red Fleet Reservoir to supply the projected total population needs in 1985, 1989, and 1994.[24] The flow at Ashley Springs, now at 9 MGD,[24] can likely be increased to as much as 15 MGD. With this increased flow, Vernal can extract Red Fleet water at a rate of 7.1 MGD,[14] providing a total raw supply capacity of 22.1 MGD. Assuming a 200 GPD/person[24] flow for future population increments, this raw supply could serve as many as 67,000 additional persons.

Upon construction of new water treatment facilities by Vernal City and Ashley Valley Water and Sewer Districts, the minimum valley-wide treatment capacity will be about 15 MGD. (See Section 3.1.3.) It is expected that these facilities will be on line by 1985.

Information on the surpluses and deficits to water treatment capacity due to WRSP-direct impact and cumulative projects' growth is provided in Table 7.3.2-2. A 15 MGD treatment facility will be sufficient to serve WRSP-direct impact and cumulative energy projects' impacts plus the projected baseline population during WRSP's peak project year, 1989. Total average demand would be 7.9 MGD, or 53 percent of the planned treatment capacity.

More specifically, WRSP-direct requirements will be 0.2 MGD in 1985, 1.2 MGD in 1989, and 0.8 MGD in 1994. When compared to the total treatment

capacity of 15 MGD, the WRSP-direct impact is minor, the project-induced growth using only 1.3 percent of treatment capacity in 1985, 8.0 percent in 1989, and 5.3 percent in 1994. WRSP indirect population requirements for the water treatment system will be 0.03 MGD in 1985, 0.7 MGD in 1989, and 0.75 MGD in 1994.

Cumulative energy projects' demands, including the WRSP component, will be 1.1 MGD in 1985, 3.9 MGD in 1989, and 3.5 MGD in 1994. This demand represents 7 percent of treatment capacity in 1985, 26 percent in 1989, and 23.3 percent in 1994.

These surpluses in treatment capacities are of course dependent on the new treatment facilities being built. Vernal City has sufficient funding, through its water rights revenues, to construct a treatment facility. The Ashley Valley District may not have available the needed funding for water treatment facilities.[11,14]

7.3.2.4 Wastewater Collection and Treatment

In general, the wastewater treatment and collection facilities will be adequate to serve the total projected population in 1989, the peak year of the WRSP project (Table 7.3.2-3). In 1989, total demand will be 4.9 MGD, or one-half of the system capacity of 9.8 MGD.

7.3.2.4.1 *Wastewater Collection*

Sixty-five percent of the valley-wide sewer system is either in place or under construction. Funding has run out to complete the remaining 35 percent located principally in the southeastern portion of the service area. These lines will be constructed on an as-needed basis.[24]

Land development patterns in the valley are shaped by the proximity to the sewer and water networks. Since most of the planned collections

lines, either completed or under construction, are in the northern half of the valley, land there may be developed sooner than the area south of Vernal, even though the latter is expected to come under increasing development pressures from energy projects located in the south.

7.3.2.4.2 *Wastewater Treatment*

Upon completion of the 9.8 MGD wastewater treatment plant in August 1981, WRSP-direct impact, cumulative projects' impacts, and total demands on the system are projected to be substantially less than the treatment capacity, through at least 1994.

The WRSP-direct impact need is likely to be 0.1 MGD in 1985, 0.6 MGD in 1989, and 0.4 MGD in 1994. Given an available treatment capacity of 9.8 MGD, the WRSP share may be 1.0 percent in 1985, 6.1 percent in 1989, and 4.1 percent in 1994. Thus, WRSP-direct impact may have a relatively small impact on the wastewater treatment system, even during the project's peak year. The indirect WRSP population needs for wastewater teatment is projected to be 0.03 MGD in 1985, 0.4 MGD in 1989, and 0.45 MGD in 1994.

The impact of all of the energy projects is likely to be moderate, and demand may be within the system's wastewater treatment capacity. Cumulative projects' demand may be 0.5 MGD in 1985, 2.0 MGD in 1989, and 1.6 MGD in 1994. These requirements equal 5.1 percent of capacity in 1985, 20.4 percent of capacity in 1989, and 16.3 percent of capacity in 1994.

7.3.2.5 Solid Waste

The Vernal Department of Public Works has indicated that the joint Vernal-Uintah County landfill site is adequate to meet all needs in the foreseeable future.[19] Assuming a recommended land area requirement of

.08 acres/1,000 population/year (see Table 7.1-1), a maximum yearly landfill absorption for the total population would be 3 acres in 1989. If this rate were maintained through the period 1985 - 1995, abut 30 acres, or 40 percent of the landfills remaining capacity would be utilized (the 100-acre landfill now has about 75 acres remaining). Actual land absorption will be much lower. Beyond 1994, the community may need to enlarge the landfill.

WRSP impacts, in terms of sanitation personnel required, are relatively minor. The peak requirement is projected to be slightly under one additional garbage collector. Cumulative project sanitation needs may include 6 additional garbage collectors and 3 additional vehicles.

7.3.2.6 Natural Gas

Natural gas is supplied by the Utah Gas Service only to the immediate area in and around Vernal. Outside that area, propane, electricity, and other forms of energy are used. Within Vernal, 80% of all households are served by natural gas. The Northwest Pipeline Corporation, which operates a compressor station at Brush Creek, provides the main gas supply for the Vernal area from its northwest pipeline. This gas is abundant. Utah Gas Service has the potential capability to provide natural gas service to the entire Valley area, as growth and development justify the cost of extending laterals from the main trunk lines.[4]

7.3.2.7 Law Enforcement

Ashley Valley currently operates significantly below the recommended standards for law enforcement. (See Section 3.1.11.) Although this national standard is used in these calculations, Ashley Valley may be able to safely operate with significantly fewer police than stated below.

For WRSP needs, municipal and county law enforcement agencies may need 2 additional police personnel in 1985, 13 additional in 1989, and 10 additional in 1994 to achieve the recommended standard of 2.3 policemen per 1,000 population (see Section 3.1.11 for derivation). Cumulative projects' needs could be 19 police officers in 1985, 66 officers in 1989, and 48 officers in 1994.

The increase in population could potentially generate an increase in the crime rate. Uintah County may need an additional 1.3 jail cells in 1985, 8.7 cells in 1989, and 6.2 cells in 1994 if the WRSP project is built. The County may require 12 cells in 1985, 43 cells in 1989, and 31 cells in 1994 if all projects are built.

7.3.2.8 Fire Protection

The Uintah County fire department may need an additional 1 firefighter in 1985, 8 firefighters in 1989, and 5 firefighters in 1994 if the WRSP project is built. The County may require an additional 11 firefighters in 1985, 37 firefighters in 1989, and 27 firefighters in 1994, if all projects are built.

The Utah State Insurance Service Office has not established guidelines or standards indicating threshold populations for changes from volunteer to paid fire departments. However, a municipality generally will improve its rating by having a paid fire department.

In the case of Vernal-Uintah County, the expected increase in population will affect the community's ability to protect itself from fire hazards. If the service level does not increase in proportion to the poulation increases, the rating class may decline. Having a paid fire department would be a factor in improving Vernal's fire class rating.[25]

7.3.2.9 Medical Facilities

Information on the projected impacts to the Uintah County Hospital is provided in Table 7.3.2-9. This information is displayed for baseline growth, WRSP direct growth, and cumulative projects' growth.

Total population growth, including baseline and cumulative projects' growth, may have a substantial impact on medical facilities and may create a potentially serious deficit in the availability of medical services. As indicated in Section 3.1.13, Uintah County Hospital utilization is now about 70% of a 36-bed capacity. However, there is a substantial shortage of local physicians, their availability being a major determinant of hospital utilization. If the recommended number of physicians were available, hospital utilization would approach or exceed 100%.

7.3.2.9.1 *Physicians*

Based on a recommended standard of 1.88 physicians per 1,000 population (see Section 3.1.13 for derivation), there is now a deficit of 27 doctors in Uintah County. This deficit will increase to 87 doctors by 1989 under growth projections which include baseline growth and cumulative projects' growth. More specifically, WRSP impact growth will require 2 physicians in 1985, 11 physicians in 1989, and 8 physicians in 1994. When added to the projected baseline deficit of 31 physicians, these requirements increase the projected deficit to 33 physicians in 1985, 44 physicians in 1989, and 41 physicians in 1994.

The number of physicians needed by the cumulative projects' growth is projected to be 15 in 1985, 54 in 1989, and 39 in 1994. These needs increase the projected baseline deficit to 46 doctors in 1985, 87 doctors in 1989, and 72 doctors in 1994.

During WRSP's peak year, projected impact will require 11 physicians, a 24 percent addition to the year's baseline of 45 physicians. In the same year, cumulative projects' growth may require 54 physicians, a 120 percent addition to the baseline. By 1994, WRSP and cumulative projects' growth may require, respectively, 17 percent and 87 percent additions to the baseline.

Even though the impacts are substantial, it may not be feasible or desirable to increase staff up to the service levels implied by the application of these standards. It is fairly typical for small communities to have a shortage of doctors with respect to state standards. It may be difficult to attract large numbers of physicians to relatively small communities like the Ashley Valley. Furthermore, the Utah State average ratio of doctors per population is 1.46 doctors/1000 population. Using the state average ratio in projecting needs reduces the projected total deficit in 1989 from 87 doctors to 65 doctors.

7.3.2.9.2 *Hospital Facilities*

Impacts to the Uintah County Hospital have been determined in terms of available beds per population. This is an ideal standard which assumes no deficits in the number of available physicians. Therefore the impacts displayed in Table 7.3.2-9 and discussed in the following paragraph assume a supply of physicians at par with the recommended standard. There is, on the contrary, a significant shortfall of doctors in the Ashley Valley. If this shortfall is maintained through 1994, the actual hospital bed needs will be less than the projected needs in this section.

Based on a recommended standard of 4 beds/1000 population, there exists at present a deficit of 46 beds for the 1980 Uintah County population. This deficit will increase to 175 beds for the projectred 1989 total population of 52,718. (211 beds (4 beds x 52.719) minus the existing stock of 36 beds.)

The WRSP-direct impact may require 3.5 beds in 1985, 23 beds in 1989, and 17 beds in 1994. This would represent 4 percent of the baseline in 1985, 24 percent in 1989, and 17 percent in 1994. WRSP's impact is small in 1985, but increases to a significant amount by 1989, declining somewhat by 1994. The WRSP-indirect impact may require an additional one bed in 1985, 14 beds in 1989 and 15 beds in 1994.

For accommodating needs of cumulative projects' growth, the hospital may need 33 beds in 1985, 115 beds in 1989, and 84 beds in 1994, representing 35 percent of the 1985 baseline, 116 percent of the 1989 baseline and 87 percent of the 1994 baseline. Therefore, the projected impact of all the projects would be substantial.

The community may not wish to provide medical facilities at that theoretical service level. As indicated earlier, if a deficit of physicians remains, the number of required beds will be less than that indicated, which in turn would reduce the capital cost of building new facilities. Ultimately, the community may desire a trade-off between achieving a recommended physician/population ratio and reducing capital construction costs for smaller hospital needs at reduced staffing levels.

7.3.2.10 Alcohol Rehabilitation Services

An increase of population with the socioeconomic mix of the incoming construction and operation workers could increase the incidence of alcohol abuse and the need for alcohol rehabilitation counselors.

Based on a standard of 1.0 alcohol rehabilitation counselor per 10,000 population increments, Gibbs & Hill estimates that WRSP direct impact could generate the need for 0.1 counselor in 1985, 0.6 counselor in 1989, and 0.4 counselor in 1994. At no time would the WRSP direct population alone have a need for more than one part-time alcohol rehabilitation counselor. However, these estimates have not considered the

camp-based construction workforce whose incidence of alcohol abuse may be greater than that of the general population.

Cumulative projects' needs for alcohol rehabilitation services are estimated to be 0.8 counselor in 1985, 2.9 counselors in 1989, and 2.1 counselors in 1994. This need added to the baseline requirements of 2 counselors throughout the 10 year period would increase the total need to 2.8 counselors in 1985, 4.9 counselors in 1989, and 4.1 counselors in 1994. WRSP direct impact alone represents a relatively small portion of these projected totals.

Ashley Valley now has one counselor for both alcohol and drug abuse counseling, providing outpatient service only.[16] To achieve the above standard, an additional 4 alcohol rehabilitation counselors would be required by 1989. Furthermore, an[16] in-patient social and medical detoxification facility would be needed.

7.3.2.11 Youth Services

Typical youth services that should be provided in the community include employment counseling, youth guidance, and recreation. As a result of WRSP direct impact growth, 0.1 youth employment counselor would be needed in 1985, 0.6 counselor in 1989, and 0.4 counselor in 1994. These needs are projected on a recommended service level of 1 youth employment counselor per 10,000 people. At no time during the project life would the WRSP direct population require more than the part-time services of one youth employment counselor.

Cumulative projects' impacts would require 0.8 youth employment counselor in 1985, 2.9 counselors in 1989, and 2.1 counselors in 1994. When added to the baseline growth needs of 2 employment counselors throughout the 10 year period, Uintah County should hire a total of 3 counselors by 1985 and 5 counselors by 1989. 1994 needs will decrease to 4 counselors.

Youth guidance programs and facilities may also be needed as the population increases. The application of recommended standards indicates a need for 1 youth guidance center per 50,000 population. Such a facility would provide shelter for homeless or mistreated children, as well as providing a detention facility for problem children. Uintah County is building such a facility now, which will be completed in June, 1982.[16]

7.3.2.12 Recreation

Using a standard of 9.5 acres per 1,000 population for playgrounds and neighborhood, community, and county parks, the Ashley Valley should have 150 acres in parks for its 1980 population. The Valley presently has 873 acres, a surplus of 723 acres.[1] Furthermore, thousands of acres of federal recreation areas are within close proximity to the Valley.

WRSP impact needs would add an additional 8 acres in 1985, 55 acres in 1989, and 39 acres in 1994. The indirect WRSP impact needs for recreational acreage are 2.6 acres in 1985, 32.8 acres in 1989, and 35.5 acres in 1994. Cumulative project needs are 78 acres in 1985, 273 acres in 1989, and 198 acres in 1994. In the peak year, cumulative recreational requirements are 500 acres less than the existing baseline surplus. Therefore, based on this analysis, Gibbs & Hill estimates that no additional outdoor recreation areas will be required.

7.4 IMPACTS ON RANGELY, COLORADO

The WRSP is estimated to potentially generate as many as 785 direct jobs and a total of 1,947 indirect jobs for residents in Rangely, Colorado. Rio Blanco County earnings would increase by $31.3 million. (See Table 7.3.1-3.)

7.4.1 Land Area

WRSP's potential direct population locating in Rangely will need 79 housing units in 1985, 602 housing units in 1989, and 467 housing units in 1994. The corresponding land requirements would be 17 acres in 1985, 128 acres in 1989, and 93 acres in 1994. (See Table 7.3.2-10.)

Within the Town of Rangely are approximately 350 vacant acres zoned for residential use. WRSP needs could absorb 5 percent of this acreage in 1985, 37 percent in 1989, and 27 percent in 1994. The impacts of the latter two years are substantial, since suitable land outside the town is scarce. The substantial difference between WRSP's peak and ultimate housing needs indicates a substantial need for temporary housing during the peak years of project construction. However, the peak need would flatten out somewhat if the needs of other energy projects are considered.

7.4.2 Water Supply and Treatment

The WRSP direct employment added to the population of Rangely would consume approximately 44,000 gallons of water per day in 1985, 385,000 gallons per day in 1989, and 252,000 gallons per day in 1994.

The Rangely water treatment plant will have an ultimate treatment capacity of 4.32 MGD.[3] The WRSP impact component would consume 1.0 percent of the capacity in 1985, 8.9 percent in 1989, and 5.8 percent in 1994, a relatively small proportion of the total capacity. Therefore, Rangely appears to have adequate capacity to serve WRSP's water needs.

7.4.3 Wastewater Treatment

Wastewater flow requirements in Rangely for the WRSP direct population would be: 22,000 gallons per day in 1985, 193,000 gallons per day in 1985, and 126,000 gallons per day in 1994.

Rangely's wastewater treatment plant will ultimately serve 10,000 persons and will have a treatment capacity of 1.0 MGD.

WRSP's share of the total treatment capacity would be 2.2 percent in 1985, 19.3 percent in 1989, and 12.6 percent in 1994. The 1989 share, while not enormous, is significant in the context of the cumulative impact of all projects.

7.4.4 Schools

The WRSP direct impacts would add 52 pupils to Rangely schools in 1985, 388 pupils in 1989, and 268 pupils in 1994.

The Rangely School District presently has the physical capacity to enroll 615 additional pupils. WRSP would absorb 8.4 percent of the additional capacity in 1985, 63 percent in 1989, and 44 percent in 1994.

The District can add 200 pupils to its schools at the existing staffing level before exceeding the current state teacher/pupil ratio. Therefore, the 1985 WRSP direct enrollment would not require any additional teachers. However to maintain the state average teacher/pupil ratio, the District would need 9 additional teachers in 1985 and 3 additional teachers in 1994 as a consequence of projected WRSP impact. If the recommended service level standard of one teacher per 25 pupils is used, the WRSP impact would be reduced somewhat to 7.5 teachers in 1989 and 3 teachers in 1994.

7.4.5 Law Enforcement

WRSP law enforcement needs in Rangely consist of personnel and vehicle requirements. Personnel needs would be 0.5 officer in 1985, 4.4 officers in 1989, and 2.9 officers in 1994. Calculated vehicle needs would be .09 patrol car in 1985, 0.77 patrol car in 1989, and 0.50 patrol car in 1994.

Rangely now has a law enforcement officer to population ratio which is under the recommended standard of 2.3 officers per 1,000 population. In order to maintain this standard, Rangely should add one part-time officer in 1985, 4 officers in 1989, and 3 officers in 1994 to offset the potential impact of WRSP.

7.4.6 Fire Protection

WRSP fire protection needs in Rangely were calculated in terms of personnel and vehicle requirements. Personnel needs would be 0.3 firefighter in 1985, 2.5 firefighters in 1989, and 1.6 firefighters in 1994. Vehicle requirements would be 0.02 pumper and truck in 1985, 0.19 pumper and truck in 1989, and .13 pumper and truck in 1994.

Rangely's fire protection class rating is indicative of an inadequate fire fighting capability.[1] There is no surplus of firefighting capacity and Rangely should increase its firefighting staff by 3 firefighters in 1989 and 2 firefighters in 1994 to offset WRSP's potential impact.

7.4.7 Medical Facilities

The WRSP direct added population to Rangely would require less than one hospital bed in 1985, 8 hospital beds in 1989, and 5 hospital beds in 1994. Since the Rangely District Hospital is a 28-bed facility, now used at only 22 percent of capacity, there should be ample room to serve

the WRSP impact population. During its peak year, WRSP would absorb only 36 percent of Rangely District Hospital's excess capacity.

WRSP medical needs in Rangely would also include less than one full time physician in 1985, 3.6 physicians in 1989, and 2.4 physicians in 1994. Rangely has a shortage of doctors; there is no excess capacity of practitioners to serve additional patients locally. If additional doctors cannot be attracted to the area, the WRSP usage of the hospital would be less than that shown above as many patients would be treated elsewhere.

TABLE 7.0-1

WRSP POPULATION PROJECTIONS AND SETTLEMENT DISTRIBUTIONS,
1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
CONSTRUCTION EMPLOYMENT	576	1830	1032	346	1032	2390	4037	3797	2933	2879	1618	280	0
OPERATIONS EMPLOYMENT	0	10	68	369	838	885	991	1286	1867	2215	2492	3040	3353
CONSTRUCTION CAMP POPULATION	288	915	516	173	516	1195	2018	1899	1469	1439	809	140	0
WRSP DIRECT POPULATION	1584	4144	2504	1768	4568	7749	9719	11989	11614	13154	10319	8777	8978
WRSP INDIRECT POPULATION		242	307	297	1152	2706	7171	6143	6090	6154	6914	6082	6957
WRSP INDUCED POPULATION	1296	4386	2811	2065	5720	10455	16390	19132	17704	19308	17233	14859	15935
RANGELY TOTAL (24 Percent)	242	833	551	454	1249	2222	3569	3896	3396	4289	3342	3533	3324
ASHLEY VALLEY TOTAL (76 Percent)	766	2638	1744	1437	3955	7946	11302	12337	12339	13580	12482	11136	12110
WRSP DIRECT INCOMING POPULATION													
Rangely	168	549	322	220	708	1229	1360	1927	1717	1901	1446	1122	1261
Ashley Valley	647	2033	1267	871	2532	4013	5651	5801	5334	5731	4641	3765	4132
WRSP TOTAL INCOMING POPULATION													
Rangely	194	666	441	363	999	1778	2677	2922	2922	3217	2769	2296	2437
Ashley Valley	613	2110	1395	1150	3164	5997	8477	9253	9254	10185	8737	7271	7871
WRSP INDUCED SCHOOLCHILDREN	288	956	622	451	1251	2894	3708	3974	3870	4216	3751	3219	3449

Source: Gibbs & Hill, Inc.

TABLE 7.1-1

FACILITIES AND STANDARDS FOR PROJECTING WRSP NEEDS IN ASHLEY VALLEY

HOUSING:	
Single Family	3.5 dwelling units/acre
Duplex/Townhouse	12.0 dwelling units/acre
Apartment	20 dwelling units/acre
Mobile Home	8 dwelling units/acre
EDUCATION:	
Elementary School	2.8 acres/1,000 population 25 pupils/teacher 30 pupils/classroom
Junior High School	1.4 acres/1,000 population 25 pupils/teacher 30 pupils/classroom
Senior High School	1.8 acres/1,000 population 25 pupils/teacher 30 pupils/classroom
COMMUNITY FACILITIES:	
Library	3 books/capita 0.14 acres/1,000 population 0.28 employees/1,000 population
Police Protection	0.4 vehicles/1,000 population 0.06 acres/1,000 population 2.3 officers/1,000 population 1.5 jail cells/1,000 population
Fire Protection	0.1 pumper/1,000 population 0.1 truck/1,000 population 0.08 acres/1,000 population 1.3 firemen/1,000 population
Medical Services	4.0 beds/1,000 population 0.25 acres/1,000 population 1.88 doctors/1,000 population

TABLE 7.1-1

Continued

Social Services	1.0 alcohol rehabilitation counselor/10,000 population 1.0 youth employment counselor/ 10,000 population 1.0 youth guidance home/ 50,000 population 1.0 day care center/5,000 population
RECREATION:	
Playground	1.5 acres/1,000 population
Neighborhood Park	2.0 acres/1,000 population
Community Park	3.0 acres/1,000 population
County Park	3.0 acres/1,000 population
Golf Course	1 9-hole course/25,000 population; 75 acres/ 9-hold course 1 18-hole course/50,000 population; 150 acres/ 18-hole course
COMMERCIAL AND INDUSTRIAL:	
Neighborhood Retail	0.56 acres/1,000 population
Community Retail	0.32 acres/1,000 population
Light Industry	2 acres/1,000 population
Heavy Industry	10 acres/1,000 population
UTILITIES:	
Water Distribution	200 gallons/day/person
Water Treatment Plant	less than one acre
Wastewater Collection	120 gallons/day/person

TABLE 7.1-1

Continued

Wastewater Treatment Plant	0.25 acres
Solid Waste Disposal	0.08 acres/1,000 population
Solid Waste Collection	1.0 minute/household 1.6 cubic yards/person/year
Electric Power	2300 kWh/person/year
Telephone Service	0.98 connection/household
Natural Gas	35 million cubic feet/ 1,000 population/year
CAMPSITE:	
Housing:	
Mobile Home	12 dwelling units/acre
Recreation Vehicle	18 dwelling units/acre
Prefabricated Modular Units	18 dwelling units/acre
Community Facilities:	
	35 sf/employee for 250 employees
	27 sf/employee for 500 employees
OUTDOOR RECREATION:	
Basketball	20 sf/employee
Tennis	20 sf/employee
Playing Field	2 acres

Source: Gibbs & Hill, Inc.

TABLE 7.1-2

SUMMARY OF LAND AREA NEEDS FOR WRSP HOUSING AND COMMUNITY FACILITY REQUIREMENTS IN ASHLEY VALLEY

	Acres Required*					
	Phase I 1982-1985		Phase II 1986-1989		Phase III 1990-1994	
Facility	Average	Peak	Average	Peak	Average	Peak
HOUSING	63.3	124.0	274.9	386.7	336.4	392.0
EDUCATION	6.0	12.2	27.0	34.8	28.4	34.7
COMMUNITY SERVICES	0.53	1.1	2.4	3.1	2.5	3.1
RECREATION	9.5	19.3	42.7	55.1	45.0	54.9
COMMERCIAL/ INDUSTRIAL	12.8	26.2	57.9	74.7	61.1	74.5
UTILITIES	0.4	0.8	1.7	2.2	1.8	2.2
TOTAL LAND REQUIREMENTS	92.5	183.5	406.2	556.6	475.2	561.3

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*See tables in Appendix B for detailed annual figures.

Source: Gibbs & Hill, Inc.

TABLE 7.1-3

PERSONNEL NEEDS FOR WRSP COMMUNITY FACILITY REQUIREMENTS IN ASHLEY VALLEY

	Phase One 1982-1985		Phase Two 1986-1989		Phase Three 1990-1994	
	Average	Peak	Average	Peak	Average	Peak
TEACHERS	15.4	38	57	80	58	76
LIBRARY PERSONNEL	--	--	1.25	2	1.3	2
DOCTORS	1.9	4	38.5	11	8.9	11
POLICE	2.3	5	10.3	13	10.9	13
FIREFIGHTERS	1.3	3	5.9	7	6.2	7

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*See tables in Appendix B for detailed annual figures.

Source: Gibbs & Hill, Inc.

TABLE 7.1-4

EQUIPMENT AND FACILITY NEEDS FOR WRSP
COMMUNITY FACILITY REQUIREMENTS*
IN ASHLEY VALLEY

	Phase I 1982-1985		Phase II 1986-1989		Phase III 1990-1994	
	Average	Peak	Average	Peak	Average	Peak
LIBRARY BOOKS	3,000	6,100	13,500	17,400	14,200	17,300
POLICE VEHICLES	.4	1	1.8	2	1.9	2
FIREFIGHTING VEHICLES	--	--	.9	1	1.0	1
CLASSROOMS	11	24	48	67	49	63
HOSPITAL BEDS	4	8	18	23	19	23

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*See tables in Appendix B for detailed annual figures.

Source: Gibbs & Hill, Inc.

TABLE 7.1-5

SUMMARY OF WRSP UTILITY NEEDS*
IN ASHLEY VALLEY

	Phase I 1982-1985		Phase II 1986-1989		Phase III 1990-1994	
	Average	Peak	Average	Peak	Average	Peak
WATER (MGD)	.2	.41	.9	1.16	.95	1.16
WASTEWATER (MGD)	.12	.24	.54	.70	.57	.69
ELECTRICITY (kWh/year, 1,000's)	2,280	4,676	10,350	13,340	10,900	13,296
NEW TELEPHONE CONNECTIONS REQUIRED	660	1,440	2,940	3,868	2,610	3,452

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*See Appendix B for detailed annual figures.

Source: Gibbs & Hill, Inc.

TABLE 7.2-1

PROJECTED HOUSING PREFERENCE RATIOS

Housing Type	Temporary Workers	Permanent Workers
SINGLE-FAMILY (DETACHED)	.340	.550
SINGLE-FAMILY (ATTACHED)	.015	.044
APARTMENT	.091	.129
MOBILE HOME	.456	.254
RECREATIONAL VEHICLE	.098	.023

Source: Mountain West Research, The Construction Worker Profile, prepared for the Old West Regional Commission, 1975.

TABLE 7.3.1-1

REGIONAL EARNINGS AND EMPLOYMENT IMPACT OF WRSP, 1994[1]

DIRECT WRSP EMPLOYMENT:	
Permanent Direct Employment	3,353
Average Annual Wage	$21,000
Annual Payroll	$70,413,000
Earnings Multiplier[2]	0.9054
SECONDARY WRSP EMPLOYMENT:	
Secondary Earnings	$63,375,200
Average Annual Wage	$12,800
Secondary Employment	4,951
Ratio of Secondary to Direct Jobs	1.48
TOTAL WRSP EMPLOYMENT IMPACT:	
Direct and Secondary Earnings	$133,788,200
Direct and Secondary Employment	8,304
Ratio of Total Employment to Direct Employment	2.48

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1. In 1980 dollars
2. Bureau of Business and Economic Research, University of Utah

Source: Gibbs & Hill, Inc.

TABLE 7.3.1-2

ECONOMIC IMPACT OF WRSP ON ASHLEY VALLEY ECONOMY

EARNINGS:	
Operations Payroll, Increase in Regional Earnings Attributable to WRSP[1]	$70.4 million
Ashley Valley Share @ 76.6%[2]	$53.9 million
Earnings Multiplier[3]	0.9
Secondary Earnings in Ashley Valley	$48.5 million
Total Increase in Earnings in Ashley Valley	$102.4 million
EMPLOYMENT:	
Operations Employment, Ashley Valley Share (76.6% of 3,353)	2,568
Secondary Earnings in Ashley Valley (from line 4 above)	$48.5 million
Average Annual Earnings Per Employee in Secondary Employment[4]	$12,800
Number of Secondary Employees Residing in Ashley Valley	3,789
Total Direct and Secondary Employees Residing in Ashley Valley	6,357

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1. Bechtel Engineering
2. Gibbs & Hill gravity model
3. Gibbs & Hill estimate
4. Gibbs & Hill estimate, US census

Source: Gibbs & Hill, Inc.

TABLE 7.3.1-3

ECONOMIC IMPACT OF WRSP ON ECONOMY OUTSIDE OF ASHLEY VALLEY

EARNINGS:	
Operations Payroll, Increase in Regional Earnings Attributable to WRSP[1]	$70.4 million
Rangely Share @ 23.4%[2]	$16.5 million
Earnings Multiplier[3]	0.9
Secondary Earnings in Rangely	$14.8 million
Total Increase in Earnings in Rangely and Rio Blanco County	$31.3 million
EMPLOYMENT:	
Operations Employment, Outside Ashley Valley Share (23.4% of 3,353)	785
Secondary Earnings in Rangely (from line 4 above)	$14.8 million
Average Annual Earnings Per Employee in Secondary Employment[4]	$12,800
Number of Secondary Employees Residing in Rangely	1,162
Total Direct and Secondary Employees Residing in Rangely and Rio Blanco County	1,947

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1. Bechtel Engineering
2. Gibbs & Hill gravity model application
3. Gibbs & Hill estimate
4. Gibbs & Hill estimate, US Census

Source: Gibbs & Hill, Inc.

TABLE 7.3.2-1

HOUSING AND LAND AREA NEEDS IN ASHLEY VALLEY - 1985, 1989 AND 1994

	1985	1989	1994
BASELINE POPULATION	17,617	18,627	18,678
NUMBER OF DWELLING UNITS @ 3.44 PERSONS/HOUSEHOLD	5,121	5,415	5,435
NUMBER OF ACRES REQUIRED @ 4.7 DU/ACRE	1,090 ac.	1,152 ac.	1,156 ac.
CUMULATIVE PROJECTS GROWTH:			
Number of Dwelling Units	6,825	12,157	11,517
Acreage Required*	1,484 ac.	2,587 ac.	2,303 ac.
TOTAL POPULATION:			
Number of Dwelling Units	11,946	17,572	16,952
Acreage Required*	2,574 ac.	3,739 ac.	3,459 ac.
WRSP-DIRECT INDUCED POPULATION:			
Number of Dwelling Units	370	1,823	1,537
Acreage Required*	80 ac.	387 ac.	307 ac.

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* For WRSP-direct and total projects, densities have been calculated as follows: 4.6 du/acre for 1985
4.7 du/acre for 1989
5.0 du/acre for 1994

These densities differ because of the varying mix of construction and operations personnel and the different housing preference patterns projected for each group.

Source: Gibbs & Hill, Inc.

TABLE 7.3.2-2

WATER SYSTEM SURPLUSES AND DEFICITS IN ASHLEY VALLEY - 1980, 1985, 1989, AND 1994

Measurement Unit	Service Area Population	Capacity[1]	Average[2] Demand	Surplus (+) Deficit (-)	Service Area Population	Capacity[3]	Average[4] Demand	Surplus (+) Deficit (-)
SUPPLY/TREATMENT			1980				1985	
Baseline Growth	16,168	9.0 MGD	3.5 MGD	+1.0 MGD	17,617	15.0 MGD	3.8 MGD	+11.2 MGD
WRSP Direct Growth	-	-	-	-	871	15.0 MGD	0.2 MGD	+11.0 MGD
Percent of Baseline					4.9 Percent			
Cumulative Projects Growth	-	-	-	-	5,260	15.0 MGD	1.1 MGD	+10.1 MGD
Percent of Baseline					29.9 Percent			
Total Population	16,168	9.0 MGD	3.5 MGD	+1.0 MGD	23,748	15.0 MGD	4.9 MGD	+10.1 MGD
SUPPLY/TREATMENT			1989				1994	
Baseline Growth	18,627	15.0 MGD	4.0 MGD[1]	+11.0 MGD	18,698	15.0 MGD	4.0 MGD[1]	+11.0 MGD
WRSP Direct Growth	5,801	15.0 MGD	1.2 MGD	+9.8 MGD	4,132	15.0 MGD	0.8 MGD	+10.2 MGD
Percent of Baseline	31.1 Percent				22.1 Percent			
Cumulative Projects Growth	19,738	15.0 MGD	3.9 MGD	+7.1 MGD	16,299	15.0 MGD	3.3 MGD	+ 7.7 MGD
Percent of Baseline	106.0 Percent				87.2 Percent			
Total Population	44,166	15.0 MGD	7.9 MGD	+7.1 MGD	39,129	15.0 MGD	7.3 MGD	+ 7.7 MGD

1. Current flow at Ashley Springs is 9.0 MGD; however, only 4.5 MGD is deliverable
2. 8.65 MGD peak factor divided by a peaking factor of 2.5, yields 3.5 MGD or 216 GPD/person
3. Ashley Valley District is planning a 10-15 MGD treatment plant at Ashley Springs. The size of this facility is dependent on Vernal City's continued use of Ashley Springs, since the City is under contract to purchase 8,000 acre-feet (7.14 MGD) from Red Fleet Reservoir. A conservative assumption is for Ashley Valley District to need a 10 MGD treatment capacity and Vernal City to need a 5 MGD treatment capacity, or 15 MGD total.
4. Increment to baseline growth calculated at 200 GPD/person

Source: Gibbs & Hill, Inc.

TABLE 7.3.2-3

WASTEWATER SYSTEM SURPLUSES AND DEFICITS IN ASHLEY VALLEY - 1980, 1985, 1989 AND 1994

Measurement Unit	Service Area Population	Capacity	Average Demand	Surplus (+) Deficit (-)	Service Area Population	Capacity	Average[3] Demand	Surplus (+) Deficit (-)
COLLECTION/TREATMENT			1980				1985	
Baseline Growth	6,600	1.0 MGD[1]	1.7 MGD	+0.7 MGD	17,617	9.8 MGD[2]	2.8 MGD	+7.0 MGD
WRSP Direct Growth	-	-	-	-	871	9.8 MGD	0.1 MGD	+6.9 MGD
Percent of Baseline					4.9 Percent			
Cumulative Projects Growth	-	-	-	-	5,260	9.8 MGD	0.5 MGD	+6.5 MGD
Percent of Baseline					29.9 Percent			
Total Population	6,600	1.0 MGD	1.7 MGD	+0.7 MGD	23,748	9.8 MGD	3.3 MGD	+6.5 MGD
COLLECTION/TREATMENT			1989				1994	
Baseline Growth	18,627	9.8 MGD	2.9 MGD	+6.9 MGD	18,698	9.8 MGD	2.9 MGD	+6.9 MGD
WRSP Direct Growth	5,801	9.8 MGD	0.6 MGD	+6.3 MGD	4,132	9.8 MGD	0.4 MGD	+6.5 MGD
Percent of Baseline	31.1 Percent				22.1 Percent			
Cumulative Projects Growth	19,738	9.8 MGD	2.0 MGD	+4.9 MGD	16,299	9.8 MGD	1.6 MGD	+5.3 MGD
Percent of Baseline	106.0 Percent				87.2 Percent			
Total Population	44,166	9.8 MGD	4.9 MGD	+4.9 MGD	39,129	9.8 MGD	4.5 MGD	+5.3 MGD

1. Capacity of Vernal City sewage treatment plant to be replaced by new valley-wide treatment plant August 1981
2. Capacity of new valley-wide treatment plant
3. Demand increments calculated at 100 GPD/person

Source: Gibbs & Hill, Inc.

TABLE 7.3.2-4

SCHOOL LAND AREA SURPLUSES AND DEFICITS IN UINTAH COUNTY - 1980, 1985, 1989 AND 1994

	Population	Land Area[4]	Surplus (+) Deficit (-)	Population	Recommended Land Area	Surplus (+) Deficit (-)
		1980			1985	
BASELINE POPULATION	20,506	320 ac	+135 ac	22,677	136 ac	+122 ac
WRSP DIRECT GROWTH[1]	--	--	--	871	5 ac	+117 ac
PERCENT OF BASELINE					3.8 percent	
TOTAL PROJECTS' GROWTH[2]	--	--	--	7,824	47 ac	+ 75 ac
PERCENT OF BASELINE					34.5 percent	
TOTAL POPULATION[3]	20,506	320 ac	+135 ac	30,501	183 ac	+ 75 ac
		1989			1994	
BASELINE POPULATION	23,977	144 ac	+114 ac	24,069	144 ac	+114 ac
WRSP DIRECT GROWTH[1]	5,801	35 ac	+ 79 ac	4,132	25 ac	+ 89 ac
PERCENT OF BASELINE		24.2 percent			17.2 percent	
TOTAL PROJECTS' GROWTH[2]	27,916	167 ac	- 53 ac	20,896	125 ac	- 11 ac
PERCENT OF BASELINE		116.4 percent			86.8 percent	
TOTAL POPULATION[3]	51,893	311 ac	- 53 ac	44,965	269 ac	- 11 ac

1. WRSP direct growth is included within total projects growth.
2. Total projects growth consist of WRSP plus all other expected energy projects.
3. Total population is the baseline plus total projects growth.
4. Land area includes only the 135 acres of vacant land owned by the School District.

Sources: Uintah County School District and Gibbs & Hill, Inc.

TABLE 7.3.2-5

SCHOOL CAPACITY SURPLUSES AND DEFICITS IN ASHLEY VALLEY - 1980, 1985, 1989 AND 1994[1]

Measurement Unit	Enrollment	School Capacity	Surplus (+)[5,6] Deficit (-)	Enrollment	Recommended School Capacity	Surplus (+) Deficit (-)
ENROLLMENT		1980			1985	
Baseline Growth	5,430	4,823	- 607	6,018	6,018	- 595
WRSP Direct Growth[2]	-	-	-	205	205	- 800
Percent of Baseline	0.0 Percent			3.4 Percent		
Total Project Growth[3]	-	-	-	1,721	1,721	- 2,316
Percent of Baseline	0.0 Percent			28.6 Percent		
Total Population[4]	5,430	4,823	- 607	7,739	7,739	- 2,316
ENROLLMENT		1989			1994	
Baseline Growth	6,364	6,364	- 961	6,388	6,388	- 965
WRSP Direct Growth[2]	1,169	1,169	- 2,110	896	896	- 1,861
Percent of Baseline	18.4 Percent			14.0 Percent		
Total Project Growth[3]	6,110	6,110	- 7,044	4,523	4,523	- 5,481
Percent of Baseline	96.0 Percent			70.8 Percent		
Total Population[4]	12,474	12,474	- 7,044	10,911	10,911	- 5,481

1. See Appendix B, Tables B-4 and B-18 for derivation
2. WRSP direct growth is included within total projects growth
3. Total projects growth consists of WRSP plus all other expected energy projects
4. Total population is the baseline plus total projects growth
5. Surplus or deficit represents surpluses or deficits as compared to the existing school capacities.
6. An additional 600-seat school will be added by 1985. This has been added to the existing capacity for 1985, 1989. and 1994.

Sources: Uintah County School District, Utah State Education Department, and Gibbs & Hill, Inc.

TABLE 7.3.2-6

NUMBER OF SCHOOL SURPLUSES AND DEFICITS IN ASHLEY VALLEY - 1980, 1985, 1989 AND 1994

Measurement Unit	Enrollment	Number of Schools	Surplus (+)[4,5] Deficit (-)	Enrollment	Recommended Number of Schools	Surplus (+) Deficit (-
SCHOOLS (500 PUPILS/SCHOOL)		1980			1994	
Baseline Growth	5,430	9.4	- 1.6	6,018	12.00	- 2.3
WRSP Direct Growth[1]	-	-	-	205	.41	- 2.0
Percent of Baseline	0.0 Percent			3.4 Percent		
Total Projects Growth[2]	-	-	-	1,721	3.50	- 5.1
Percent of Baseline	0.0 Percent			28.6 Percent		
Total Population[3]	5,430	9.4	- 1.6	7,739	15.50	- 5.1
SCHOOLS (500 PUPILS/SCHOOL)		1989			1994	
Baseline Growth	6,364	12.7	- 2.3	6,388	12.7	- 2.3
WRSP Direct Growth[1]	1,169	2.4	- 4.7	896	1.8	- 4.1
Percent of Baseline	18.4 Percent			14.0 Percent		
Total Projects Growth[2]	6,110	12.3	-14.6	4,523	9.3	-11.6
Percent of Baseline	96.0 Percent			70.8 Percent		
Total Population[3]	12,474	25.0	-14.6	10,911	22.0	-11.6

1. WRSP direct growth is included within total projects growth
2. Total projects growth consists of WRSP plus all other expected energy projects
3. Total population is the baseline plus total projects growth
4. Surplus or deficit represents surpluses or deficits as compared to the existing number of schools
5. An additional 600-seat school will be added by 1985. This has been added to the existing capacity for 1985, 1989 and 1994.

Sources: Uintah County School District, Utah State Education Department, and Gibbs & Hill, Inc.

TABLE 7.3.2-7

TEACHER SURPLUSES AND DEFICITS IN ASHLEY VALLEY - 1980, 1985, 1989 AND 1994

easurement Unit	Enrollment	Number of Teachers	Surplus (+)[4,5] Deficit (-)	Enrollment	Recommended Number of Teachers	Surplus (+)[4,5] Deficit (-)
EACHERS		1980			1985	
Baseline Growth	5,430	219	+ 2	6,018	241	- 41
WRSP Direct Growth[1]	-	-	-	205	8	- 12
Percent of Baseline	0.0 Percent			3.4 Percent		
Total Project Growth[2]	-	-	-	1,721	69	- 73
Percent of Baseline	0.0 Percent			28.6 Percent		
Total Population[3]	5,430	219	+ 2	7,739	310	- 73
EACHERS		1989			1994	
Baseline Growth	6,364	255	- 18	6,388	256	- 19
WRSP Direct Growth[1]	1,169	47	- 65	896	36	- 55
Percent of Baseline	18.4 Percent			14.0 Percent		
Total Project Growth[2]	6,110	262	-262	4,523	180	-199
Percent of Baseline	96.0 Percent			70.8 Percent		
Total Population[3]	12,474	499	-262	10,911	436	-199

1. WRSP direct growth is included within total projects growth
2. Total projects growth consists of WRSP plus all other expected energy projects
3. Total population is the baseline plus total projects growth
4. Surplus or deficit represents surpluses or deficits as compared to the existing number of teachers
5. An additional 600-seat school will be added by 1985. This has been added to the existing capacity for 1985, 1989, and 1994.

Sources: Uintah County School District, Utah State Education Department, and Gibbs & Hill, Inc.

TABLE 7.3.2-8

PROJECTED SCHOOL NEEDS, 1980 - 1994

	1985	1989	1994
NEW SCHOOL NEEDED:[1]			
Baseline	1.6	2.3	2.3
Cumulative Projects	3.5	12.3	9.3
Percent of Total	(69%)	(84%)	(80%)
Total Growth[2]	5.1	14.6	11.6
WRSP Direct[3]	0.4	2.4	1.8
Percent of Total	(8%)	(16%)	(16%)
ADDITIONAL TEACHERS:			
Baseline	4[4]	18	19
Cumulative Projects	69	244	180
Percent of Total	(95%)	(93%)	(90%)
Total Growth[2]	73	262	199
WRSP Direct[3]	8	47	36
Percent of Total	(11%)	(18%)	(18%)

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1. Assume 500 pupil school size.
2. Total Growth is the sum of baseline and cumulative projects.
3. WRSP growth is a component of cumulative projects.
4. Excludes 18 additional teachers needed to staff new elementary school in 1983.

Source: Gibbs & Hill, Inc.

TABLE 7.3.2-9

HEALTH CARE SURPLUSES AND DEFICITS IN UINTAH COUNTY - 1980, 1985, 1989, AND 1994

Measurement Unit	Service Area Population	Service Level	Surplus (+) Deficit (-)	Measurement Unit	Service Area Population	Service Level	Surplus (+) Deficit (-)
	HOSPITAL BEDS				PHYSICIANS		
			1980				
Baseline Growth	20,506	36.0	-46.0	Baseline Growth	20,506	12.0	-27.0
WRSP Direct Growth	-	-	-	WRSP Direct Growth	-	-	-
Percent of Baseline	0.0 Percent			Percent of Baseline	0.0 Percent		
Cumulative Projects Growth	-	-	-	Cumulative Projects Growth	-	-	-
Percent of Baseline	-	-	-	Percent of Baseline	0.0 Percent		
Total Population	20,506	36.0	-46.0	Total Population	20,506	12.0	-27.0
			1985				
Baseline Growth	22,677	90.0	-54.0	Baseline Growth	22,677	43.0	-31.0
WRSP Direct Growth	871	3.5	-57.5	WRSP Direct Growth	871	2.0	-33.0
Percent of Baseline	3.8 Percent			Percent of Baseline	3.8 Percent		
Cumulative Projects Growth	8,166 8,166	33.0 33.0	-87.0 -87.0	Cumulative Projects Growth	8,166	15.0	-46.0
Percent of Baseline	-	-	-	Percent of Baseline	34.5 Percent		
Total Population	30,843	123.0	-87.0	Total Population	30,843	58.0	-46.0
			1989				
Baseline Growth	23,977	96.0	-60.0	Baseline Growth	23,977	45.0	-33.0
WRSP Direct Growth	-	-	-	WRSP Direct Growth	5,801	11.0	-44.0
Percent of Baseline	24.2 Percent			Percent of Baseline	24.2 Percent		
Cumulative Projects Growth	28,741	115	-175.0	Cumulative Projects Growth	28,741	54.0	-87.0
Percent of Baseline	116.4 Percent			Percent of Baseline	120.0 Percent		
Total Population	52,718	211	-175	Total Population	52,718	99.0	-87.0
			1994				
Baseline Growth	24,069	97.0	-60.0	Baseline Growth	24,069	45.0	-33.0
WRSP Direct Growth	5,801	23.0	-83.0	WRSP Direct Growth	4,132	8.0	-72.0
Percent of Baseline	17.2 Percent			Percent of Baseline	17.2 Percent		
Cumulative Projects Growth	20,896	84.0	-144.0	Cumulative Projects Growth	20,896	39.0	-72.0
Percent of Baseline	86.8 Percent			Percent of Baseline	86.8 Percent		
Total Population	44,965	180.0	-144.0	Total Population	44,965	84.0	-72.0

Source: Gibbs & Hill, Inc.

TABLE 7.3.2-10

HOUSING AND LAND AREA NEEDS IN RANGELY
GENERATED BY WRSP DIRECT POPULATION -
1985, 1989 AND 1994

	1985	1989	1994
RANGELY WRSP-DIRECT POPULATION	220	1,927	1,261
NUMBER OF HOUSEHOLDS @ 3.44 PERSONS/DU	64	560	367
NUMBER OF ACRES REQUIRED @ 4.7 DU/ACRE	13.6 ac.	119 ac.	78 ac.
NUMBER OF DU REQUIRED	79	602	467
ACREAGE REQUIRED*	17.2 ac.	128.1 ac.	93.4 ac.

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* For WRSP-direct and total projects, densities have been calculated as follows: 4.6 du/acre for 1985
4.7 du/acre for 1989
5.0 du/acre for 1994

These densities differ because of the varying mix of construction and operations and the different housing preference pattern of each group.

Source: Gibbs & Hill, Inc.

REFERENCES - SECTION 7.0

Source Documents

1. Burns and McDonnel, 1979. Socio-economic Environmental Assessment for the Proposed Deseret Generation and Transmission Cooperative. Moon Lake Project. Kansas City, Missouri.

2. Colorado Department of Local Affairs, Division of Local Assistance; January, 1981. Rangely Community Profile. Denver.

3. Department of the Interior, Bureau of Land Management and Department of Agriculture, Rural Electrification Administration; April, 1981. Final Environmental Impact Statement, Moon Lake Power Plant Project. Salt Lake City.

4. Uintah Basin Association of Governments, 1980. The Uintah Basin Development Plan. Roosevelt, Utah.

5. Uintah Basin Association of Governments and APA Planning and Research; October, 1980. Uintah Basin Oil Shale Impact Study Interim Reports. Salt Lake City.

6. Uintah Basin Association of Government and Uintah Basin Energy Development Council, July 1, 1980, Uintah Basin Oil Shale Impact Study. Interim Report. Salt Lake City.

7. Uintah Basin Association of Governments and Uintah Basin Energy Development Council, June, 1981. Uintah Basin Oil Shale Impact Study. Interim Report. Salt Lake City.

8. Uintah Engineering, Revised Ashley Valley Wastewater Facilities Design Report. Vernal, Utah.

Personal Contacts

9. Troy Austler, Uintah Engineering; personal communication, June, 1981.

10. Ron Enloe, Personnel Director, Uintah County Hospital; personal communication, May, 1981.

11. Norman Fletcher, District Supervisor, Ashley Valley. Sewer and Water District; personal communication, April, 1981.

12. Corey Grua, White River Shale Project; personal communications, March and April, 1981.

13. Robert Hugie, Assistant City-County Planner, Vernal City and Uintah County; personal communication, April, 1981.

14. Carl Jensen, Supervisor, Vernal Sewer and Water District; personal communications, May, June and July, 1981.

15. Denise Lindberg, Ph.D., Community Based Educational Planning Specialist, Utah Office of Education; personal communication, April, 1981.

16. McCord Marshall, Director, Utah Department of Social Services, District #6 (Uintah and Daggett Counties); personal communication, July, 1981.

17. Craig Merrill, Health Planning and Policy Department, Utah State Planning Office; personal communication, April, 1981.

18. Veda Muller, Town Clerk, Rangely, Colorado; personal communication, July, 1981.

Personal Contacts (Continued)

19. Kaye Overson, Director Vernal Department of Public Works; personal communication, July, 1981.

20. Don Peach, Town Administrator, Rangely; personal communication, June, 1981.

21. Ronald Perry, Administrator, Uintah County Hospital, May, 1981.

22. Gary Stetler, District Manager, Utah Gas Service, Company, Vernal; personal communication, June, 1981.

23. Richard Tolley, Finance Officer/Clerk-Treasurer, Uintah School District; personal communication, May, 1981.

24. Russ Vernon, Uintah Engineering, Vernal, Utah; personal communications, March and July, 1981.

25. Kim Wilson, Utah Insurance Service Office; personal communication, July, 1981.

Other Source Materials

26. Eastern Montana Social and Community Service Task Force, September, 1980; Adequacy Standards for Social Services.

27. Rangely, Colorado: Map 1980-81 Capital Budget.

28. Rangely, Colorado: Floodplain Boundary Map, December, 1977.

29. Rangely, Colorado: Official Zoning Map, August, 1979.

Other Source Materials (Continued)

30. Thomas Smith, Consultant to Department of Energy, Utah Department of Public Safety; personal communication, April, 1981.

31. Robert Downard, Chief, Vernal Police Department; personal communication, April, 1981.

32. Arden Stewart, Sheriff, Uintah County; personal communication, May, 1981.

33. Lt. Howard Powell, Supervisor for Uintah County, Utah Highway Patrol; personal communication, May, 1981.

34. Dale Slaugh, Chief, Vernal Volunteer Fire Department; personal communication, May, 1981.

35. D. L. Wetenkamp, Executive Vice-President, Vernal Chamber of Commerce; personal communication, April, 1981.

APPENDIX A

EXISTING, COMPARABLE AND PROPOSED STANDARDS FOR PROJECTING NEEDS GENERATED BY WRSP

In the following tables, existing conditions are expressed in terms of an existing Vernal ratio (EV) representing the current level of service for each facility. For housing, the EV ratio represents density requirements mandated by the local zoning ordinance. For community support facilities, recreation, and utilities, the ratio presents a variety of measurement factors such as land area, employment, flow rates, etc. The existing Vernal ratio provides two things: a basis for determining the applicability of the comparative standard; and a basis for measuring the relative adequacy of the existing service level.

The comparative standards are published planning ratios which have become generally accepted performance measures and which provide a basis for determining an optimal service level for a particular facility. Within the tables where several comparables were available, representing a wide range of values, an average was calculated and compared with the existing ratio for suitability.

The proposed standard is a customized ratio which is derived from the existing service level and the comparative standards. Gibbs & Hill selected these proposed standards by judging the appropriateness of each comparable standard in terms of the context in which the standards were developed. Generally, standards developed for determining the impact of large scale energy development, particularly regarding the oil shale industry in Western states, were judged as the most appropriate. Generally also, the standards chosen approximate the average of the most appropriate comparables; however, for certain facility types, particularly housing and utilities, local Ashley Valley factors influenced the choice. The proposed density standards for housing were based on local

zoning requirements. The proposed flow rates and area requirements for water and wastewater were determined by official programmed improvements to the existing utility networks.

In reading the tables, each existing and comparable standard is keyed to a bibliographic source number. The source index is provided following the last page of tables.

TABLE A-1

EXISTING, COMPARABLE, AND PROPOSED STANDARDS
FOR HOUSING IN ASHLEY VALLEY

Housing Type	Source	Net du/acre	Average	Proposed
SINGLE-FAMILY DETACHED				
	EV	5.4[1]	3.4	3.5
	5	3.6		
	2,6	4.0		
	10	3.0		
	11	3.0		
DUPLEX/TOWNHOUSE	EV	9.0[2]	11.5	12.0
	5	7.3		
	11	10.0		
	17	16-19		
	2	10-12		
APARTMENT	EV	34.0[3]	19.0	20.0
	5	14-25		
	10	26.0		
	2	12-20		
	11	15.0		
	17	18.0		
MOBILE HOME	EV	8.0[4]	10.8	8.0
	5	8.0		
	10	10.5		
		14-17		
		11-17		
	2	8-10		
	6	12.0		

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1. Based on 8000 sf/lot permitted by Uintah County Zoning Ordinance, also cited as current average lot size by City/County Planner (personal communication, April, 1981).
2. Based on maximum permissible density for Large-Scale Developments (PUD's), Section 02.0900 of Uintah County Zoning Ordinance. Data on existing duplex-type development in Vernal is insufficient to provide existing standard (theoretical maximum density is 35 du/acre).
3. Current multiple-family (R-2) zoning (covered in Section 02.0880 of Uintah County Zoning Ordinance) is highly unrestrictive. The standard cited here is a theoretical maximum and should not be considered a practical standard.
4. Section 02.09922.B.3, Uintah County Zoning Ordinance.

Source: Gibbs & Hill, Inc.

TABLE A-2

EXISTING, COMPARABLE, AND PROPOSED STANDARDS
FOR EDUCATION IN ASHLEY VALLEY

Facility		Acres/1000 Population	Pupils/ Teacher	Pupils/ Classroom
ELEMENTARY SCHOOL				
Source:	EV	5.0	27.0	26
	9		22.8[1]	
	8		25.0	
	5	2.8		30
	18	2.8		
Average:		2.8	25.0	30
Proposed:		2.8	25.0	30
JUNIOR HIGH SCHOOL				
Source:	EV	2.8	24.0	23
	2	1.3		
	9		22.8*	
	5			30
	18			30
	12	1.5		
Average:		1.4		
Proposed:		1.4	25.0	30
SENIOR HIGH SCHOOL				
Source:	EV	1.2	22.0	22
	5			30
	18			30
	9		22.8[1]	
	2	1.9		
	12	1.7		
Average:		1.8		
Proposed:		1.8	25.0	30

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* Refers to all schools

Source: Gibbs & Hill, Inc.

TABLE A-3

EXISTING, COMPARABLE, AND PROPOSED STANDARDS FOR COMMUNITY FACILITIES IN ASHLEY VALLEY

Facility	Equipment/ Population	Land Area ac/1000 Population	Floor Space/ sf/1,000 Population	Employees/ 1,000 Population
LIBRARY	Books/Capita			
Source: EV (3)	1.0	0.05	425	0.23
2	3.0		550	0.28
8	3.0		700	
11	3.0		600	
5,6		0.14		
Average:	2.5		600	
Proposed:	3.0	0.14	600	0.28
POLICE PROTECTION	Vehicles/ 1000 Pop.		Jail Cells 1000 Pop.	Officers/ 1000 Pop.
Source: EV	1.8		0.3	1.6[1]
2	0.4			2.3
5	0.4	0.60		2.3
6	0.4			2.3
27			1.5[2]	
Average:	0.8			
Proposed:	0.4	0.06	1.5	2.3
FIRE PROTECTION	Equipment/ 1000 Pop.			Firemen/ 1000 Pop.
Source: EV	0.15 pumper			1.00
5		0.07		
2		0.07		1.28
		0.09		
6,5	0.10 pumper			1.30
15	0.10 truck			
Average:	0.17	0.08		1.15
Proposed:	0.10 pumper 0.10 truck	0.08		1.30
MEDICAL SERVICES	Beds/1000 Population			Doctors/ 1000 Pop.
Source: EV (15)	1.6	NA		0.45
5	4.0	0.25		
2	4.0	0.25		1.88
11	4.0			
15				1.46
Average:	3.4			1.26
Proposed:	4.0	0.25		1.88
SOCIAL SERVICES				
Alcohol Rehab	Counselors/ 10,000 Pop.			
Source: EV (27)	1.0			
27	2.0			
Average:	1.5			
Proposed:	2.0			
Youth Services	Employment Counselors/ Population			Youth Guidance Home/ Population
Source: EV (27)	0			
28	1/10,000			1/50,000[3]
Average:	.5/10,000			
Proposed:	1/10,000			1/50,000
Day Care	Day Care Centers/ Population			
Source: EV (27)				
28	1/5,000[4]			

1. Vernal City
2. Cites a range of 1-2 cells/1000 population
3. Uintah County has 1 detention home shelter; a full-service youth guidance home is under construction
4. Home-based day care program has 50 day care providers

Source: Gibbs & Hill, Inc.

TABLE A-4

EXISTING, COMPARABLE, AND PROPOSED STANDARDS
FOR RECREATION IN ASHLEY VALLEY

Facility	Acres/ 1000 Pop.	Average	Proposed
PLAYGROUND			
Source: EV	N/A	1.56	1.5
5	1.5		
11	2.0		
16	1.25		
6	1.5		
	1.56		
NEIGHBORHOOD PARK			
Source: EV	N/A	1.9	2.0
5	2.0		
11	1.5-3.0		
16	1.25		
16	2.0		
6	2.0		
COMMUNITY PARK			
Source: EV	N/A	3.1	3.0
5	2.0		
11	3.6-7.3		
16	3.0		
6	2.0		
COUNTY PARKS			
Source: EV	*	3.3	3.0
	3.0		
	4.0		
	3.0		
	Courses/ Population		Acres/ Course
GOLF COURSE			
Source: EV (1)	9-hole course/20,000		
10 (1)	9-hole course/ 5,000		
10 (1)	18-hole course/25,000		
16 (1)	9-hole course/25,000		75
16 (1)	18-hole course/50,000		150
Proposed: (1)	9-hole course/25,000		75
(1)	18-hole course/50,000		150

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* County-City ballpark complex: 20 acres
County Park: 20 acres

Source: Gibbs & Hill, Inc.

TABLE A-5

EXISTING, COMPARABLE, AND PROPOSED STANDARDS
FOR COMMERCIAL AND INDUSTRIAL LAND IN ASHLEY VALLEY

Facility	Acres/ 1000 Pop.	Average	Proposed
NEIGHBORHOOD RETAIL			
Source: EV	N/A	0.56	0.56
5	0.56		
2	0.56		
COMMUNITY RETAIL			
Source: EV	N/A	0.32	0.32
5	0.32		
2	0.32		
LIGHT INDUSTRY			
Source: EV	N/A	2.00	2.00
5	2.0		
2	2.0		
7	2.0		
HEAVY INDUSTRY[1,2]			
Source: EV	N/A	10.00	10.00
5	10.0		
2	10.0		
7	10.0		

---

1. Related to secondary industrial activity in Ashley Valley, not the oil shale project itself.
2. Represents a theoretical requirement based on Urban Land Institute standards. This standard is generally used to plan industrial land reserves for zoning purposes, but in many cases, the standard overestimates the real requirement. In the Ashley Valley, a local influx of heavy industry is not expected and therefore the industrial land requirements programmed for WRSP are probably overestimated.

Source: Gibbs & Hill, Inc.

TABLE A-6

EXISTING, COMPARABLE AND PROPOSED STANDARDS FOR UTILITIES IN ASHLEY VALLEY

Facilities		Existing	Average	Proposed
WATER DISTRIBUTION		Gals/Day/Person		
Source:	EV (19)	274[1]	200	200
	1	179[2]		
	3	179[2]		
	14	300		
	20	200		
	19	200[3]		
WATER TREATMENT PLANT		Gals/Day/Person		
Source:	EV (20)	[4]		[4]
WASTEWATER COLLECTION		Gals/Day/Person		
Source	EV (13)	350 [5]	242	120
	EV (4)	540 [6]		
	10	100		
	19	100		
	20	120 [7]		
WASTEWATER TREATMENT		Gals/Day/Person		
Source:	EV (19)	[8]		[8]
SOLID WASTE DISPOSAL		Acres/1000 Pop.		
Source:	EV (25)	5.0[9]		.08
	2	.08[10]		
SOLID WASTE COLLECTION		Pick-up Time/ Household	Cu.Yd/Person/Yr	
Source:	EV (25)	1 Minute	1.6	1 min/household
ELECTRICAL UTILITIES		KWH/Yr/Person		
Source:	EV	2300		2300
	19	1650		
GAS		MCFL/Yr/1000 Pop		
Source:	EV (29	35		35
	12	66		
TELEPHONE SERVICE		Connections/ New Household		
Source	EV	.98		.98

---

1. Average daily flow for all uses.
2. Derived from annual flow of 65.2 MG/1000 population.
3. Based on recommended peak flow to moderate density residential development.
4. Existing water treatment facility occupies 0.25 acres; proposed facility will occupy a 20-acre site. (Source: Russ Vernon, Uintah Engineering, personal communication, April, 1981).
5. Existing average daily flow for all uses.
6. Design capacity for all uses.
7. Average daily discharge.
8. New Ashley Valley sewage treatment facility under construction will occupy 1,090 acres.
9. Vernal City-Uintah County share a 100-acre landfill site with 75 percent of its capacity remaining.
10. 1.67 acre feet/person, and assuming a 20-foot depth.

Source: Gibbs & Hill, Inc.

TABLE A-7

COMPARABLE AND PROPOSED STANDARDS
FOR COMMUNITY FACILITIES IN THE WRSP CAMPSITE

Facility	Sf/Employee Population	Proposed
COMMUNITY FACILITIES*		
Source: 21,22	35 sf/employee for 250 employees	35 sf/employee for 250 employees
	27 sf/employee for 500 employees	27 sf/employee for 500 employees
OUTDOOR RECREATION		
Basketball		
Source: 22	1 court (6000 sf) for 300 employees	6000 sf/300 employees (20 sf/employee)
Tennis		
Source: 21	1 court (6000 sf) for 300 employees	6000 sf/300 employees (20 sf/employee)
21	3.2 courts/1000 employees	
Playing Field		
Source: 21	1 field/2000 users	
7	2 acres/field	
	2 acres for maximum Campsite population	

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* Includes cafeteria, laundry, banking service, game room and mail room.

Source: Gibbs & Hill, Inc.

TABLE A-8

COMPARABLE AND PROPOSED STANDARDS
FOR UTILITIES IN THE WRSP CAMPSITE

Facility			Average	Proposed
WATER TREATMENT PLANT[1]				
Source:	10	179	193	200
	19	200		
	20	200		
PACKAGE WASTEWATER				
Treatment Plant[2]				
Source:	10	100		100
	19	100		

---

1. Water supply during early years of project either could be trucked in to campsite or obtained from wells, if feasible. If treatment facility is required during later project phases, it would occupy less than 1 acre. A possible source of water supply during the later phases is a pipeline connection to the proposed White River Reservoir.
2. 10,000 sf is adequate for package wastewater treatment plants serving population of under 1,000. This will include package plant, pump station, and perimeter fencing.

Source: Gibbs & Hill, Inc.

TABLE A-9

COMPARABLE AND PROPOSED STANDARDS FOR WRSP CAMPSITE HOUSING

Housing Type		du/acre	Average	Proposed
MOBILE HOME				
Source:	5	8.0	11.5	12.0
	10	10.5		
	8	14-17		
	17	11-17		
	2	8-10		
	6	12.0		
RECREATION VEHICLE				
Source:	10	18.0		18.0
PREFABRICATED MODULAR UNITS				
Source:	22	18.0		18.0

Source: Gibbs & Hill, Inc.

REFERENCES - APPENDIX A

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APPENDIX B

WRSP NEEDS

Following are detailed tables indicating projected WRSP needs generated within community support and infrastructure areas in Ashley Valley, Rangely, and the WRSP worker campsite.

TABLE B-1

WRSP HOUSING NEEDS SPLIT BETWEEN ASHLEY VALLEY AND THE WRSP CAMPSITE, 1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
ASHLEY VALLEY													
Single-family	126	395	247	176	507	795	1113	1147	1075	1138	940	773	848
Duplex	0.8	3	2	13	24	27	28	42	42	53	59	62	68
Apartment	34	105	65	43	126	203	288	294	297	284	228	181	198
Mobile Home	20	64	46	67	167	218	265	296	314	370	372	357	391
Rec. Vehicle	4	13	10	7	20	30	268	44	44	47	38	32	35
Total	185	580	370	306	844	1273	1962	1823	1772	1892	1637	1405	1540
CAMPSITE*													
Total	231	732	413	87	413	957	1615	1519	1029	1008	404	-	-

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* Number of households; number of actual units would be less.

Source: Gibbs & Hill, Inc.

TABLE B-2

HOUSING NEEDS GENERATED BY WRSP IMPACT IN ASHLEY VALLEY, 1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
NUMBER OF UNITS REQUIRED													
Single Family	126.2	395.1	247.1	176.4	506.9	794.8	1113.0	1147.5	1074.8	1137.8	940.3	773.3	848.0
Duplex/Townhouse	0.8	0.3	0.2	23.0	24.0	27.0	28.0	42.0	42.0	53.0	59.0	62.0	68.0
Apartment	33.8	105.5	65.4	43.1	125.7	202.7	388.0	394.4	269.8	283.5	227.8	181.2	194.6
Mobile Home	20.0	64.0	46.0	67.0	167.0	218.0	265.0	296.0	314.0	370.0	372.0	357.0	391.0
Recreational Vehicle	4.0	13.4	9.6	7.2	20.3	29.8	42.1	43.6	40.0	46.6	38.1	32.4	35.2
Total Number of Units	185.0	578.0	370.1	306.7	843.0	1272.3	1736.0	1823.0	1750.0	1892.0	1367.0	1405.6	1537.4
TOTAL ACREAGE REQUIRED													
Single Family (3.5 du/ac)	36.1	112.9	70.6	50.4	144.8	227.1	318.0	327.9	307.1	325.1	268.7	220.9	242.3
Duplex/Twnhse (12.0 du/ac)	0.06	0.25	0.16	1.0	2.0	2.5	2.3	3.5	3.5	4.4	4.9	5.1	5.7
Apartment (20.0 du/ac)	1.7	5.3	3.3	2.2	6.3	10.1	14.4	14.7	13.5	14.2	11.5	9.1	9.7
Mobile Home (8.0 du/ac)	2.5	4.6	5.8	8.4	21.0	27.0	33.0	37.0	39.0	46.0	47.0	45.0	49.0
Recreat. Veh. (18 units/ac)	0.2	0.7	0.5	0.4	1.1	1.7	2.3	2.4	2.8	2.6	2.1	1.8	2.0
Total Acreage	40.5	124.0	80.0	62.0	175.0	268.0	270.0	368.7	366.0	392.0	334.0	281.5	308.6

Source: Gibbs & Hill, Inc.

TABLE B-3

PROJECTED SCHOOL ENROLLMENT GENERATED BY WRSP DIRECT IMPACT IN ASHLEY VALLEY, 1982 - 1994

Pupil Distribution*														
As % of Total Children	As % of Children Attnd. School	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
ELEMENTARY														
37.5	57.2	105.3	329.0	200.8	117.3	356.1	592.6	861.0	669.1	770.1	816.7	615.7	467.2	512.5
JUNIOR HIGH SCHOOL														
13.8	21.1	38.6	121.2	74.1	43.1	131.2	172.9	317.3	246.3	284.3	300.8	227.1	171.9	189.2
SENIOR HIGH SCHOOL														
14.3	21.7	39.4	124.3	76.5	44.7	135.1	225.7	326.4	253.8	292.6	309.8	233.9	176.6	144.6
65.6	100.0	183.3	574.5	351.4	205.1	622.4	992.2	1504.7	1169.2	1347.0	1427.3	1076.7	815.7	896.3

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* For derivation, see Appendix C and D.

Source: Gibbs & Hill, Inc.

TABLE B-4

NEEDS IN EDUCATION GENERATED BY WRSP DIRECT IMPACT, 1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
WRSP POPULATION	647	2033	1267	871	2532	4013	5651	5801	5384	5781	4641	3755	4132
ELEMENTARY SCHOOL													
Acres Required[1]	1.81	5.69	3.55	2.44	7.09	11.23	15.82	17.24	15.07	16.18	12.99	10.54	11.57
WRSP-generated Pupils	105.3	329.0	200.8	117.3	356.1	593.6	861.0	669.1	770.1	816.7	615.7	467.2	512.5
Teachers Required[2]	4.2	13.2	8.0	4.7	14.2	23.7	34.4	26.8	30.8	32.7	24.6	18.7	20.5
Classrooms Required[3]	3.5	11.0	6.7	3.9	11.9	19.8	28.7	22.3	25.7	27.2	20.5	15.6	17.1
JUNIOR HIGH SCHOOL													
Acres Required[4]	0.91	2.85	1.77	1.22	3.54	5.62	7.91	8.12	7.53	8.09	6.49	5.27	5.78
WRSP-generated Pupils	38.6	121.2	74.1	43.1	131.2	172.9	314.3	246.3	284.3	00.8	227.1	171.9	189.2
Teachers Required[2]	1.5	4.8	3.0	1.7	5.2	6.9	12.7	9.9	11.4	12.0	9.1	6.9	7.6
Classrooms Required[3]	1.3	4.0	2.5	1.4	4.4	5.8	10.6	8.2	9.5	10.0	7.6	5.7	6.3
SENIOR HIGH SCHOOL													
Acres Required[5]	1.16	3.66	2.28	1.57	4.56	7.22	10.17	10.44	9.69	10.41	8.35	6.77	7.43
WRSP-generated Pupils	39.4	124.3	76.5	44.7	135.1	225.7	326.4	253.8	292.6	390.8	233.9	176.6	194.6
Teachers Required[2]	1.6	5.0	3.1	1.8	5.4	9.0	13.1	10.2	11.7	12.4	9.4	7.1	7.8
Classrooms Required[3]	1.3	4.1	2.6	1.5	4.5	7.5	10.9	8.5	9.8	10.3	7.8	5.9	6.5
SUMMARY:													
Number of Pupils	183.3	574.5	351.4	205.1	622.4	992.2	1504.7	1169.2	1347.0	1427.3	1076.7	815.7	896.3
Acres Required	3.88	12.20	7.60	5.23	15.19	24.07	33.9	34.8	32.29	34.68	27.83	22.58	24.78
Teachers Required	7.3	23.0	14.1	8.2	24.8	39.6	60.2	46.9	53.9	57.1	43.1	32.7	35.9
Classrooms Required	6.1	19.1	11.8	6.8	20.8	33.1	50.2	39.0	45.0	47.5	35.9	27.2	29.9

1. 2.8 ac/1000 population increase
2. 25 pupils/teacher
3. 30 pupils/room
4. 4.14 ac/1000 population increase
5. 1.8 ac/1000 population increase

Source: Gibbs & Hill, Inc.

TABLE B-5

COMMUNITY FACILITY NEEDS GENERATED BY WRSP DIRECT IMPACT IN ASHLEY VALLEY, 1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
WRSP-GENERATED POPULATION	647	2033	1267	871	2532	4013	5651	5801	5384	5781	4641	3765	4132
Library													
Books (3/capita)	1941	6099	3801	2613	7596	12039	16953	17403	16152	17343	13923	11295	12396
Acres (0.14/1000 pop)	.09	.28	.18	.12	.35	.56	.79	.81	.75	.81	.65	.52	.58
Floor Area (600sf/1000 pop)	388.0	1219.8	760.2	522.6	1519.2	2407.8	3336.6	3480.6	3230.4	3468.6	2784.6	2259.0	2479.2
Employees (.28/1000 pop)	.18	.57	.35	.24	.71	1.12	1.58	1.62	1.51	1.62	1.30	1.05	1.16
POLICE PROTECTION													
Vehicles (.4/1000 pop)	.26	.81	.51	.35	1.01	1.61	2.26	2.32	2.15	2.31	1.86	1.51	1.65
Officers (2.3/1000 pop)	1.49	4.68	2.91	2.00	5.82	9.23	13.00	13.34	12.38	13.30	10.67	8.66	9.50
Acres (.06/1000 pop)	0.039	0.12	0.076	0.052	0.15	0.24	0.34	0.35	0.32	0.35	0.28	0.23	0.25
FIRE PROTECTION													
Pumpers (.1/1000 pop)	.065	.20	.13	.087	.25	.40	.57	.58	.54	.58	.46	.38	.41
Trucks (.1/1000 pop)	.065	.20	.13	.087	.25	.40	.57	.58	.54	.58	.46	.38	.41
Firemen (1.3/1000 pop)	.84	2.64	1.65	1.13	3.29	5.22	7.35	7.54	7.00	7.52	6.03	4.89	5.37
Acres (.08/1000 pop)	0.052	0.16	0.10	0.070	0.20	0.32	0.45	0.46	0.43	0.46	0.37	0.30	0.33
MEDICAL SERVICES													
Beds (4/1000 pop)	2.68	8.13	5.07	3.48	10.13	16.05	22.60	23.20	21.54	23.12	18.56	15.06	16.53
Doctors (1.88/1000 pop)	1.22	3.82	2.38	1.64	4.76	7.54	10.62	10.90	10.12	10.87	8.72	7.08	7.77
Acres (.25/1000 pop)	.16	.51	.32	.22	.63	1.00	1.41	1.45	1.35	1.44	1.16	.94	1.03
TOTAL LAND AREA REQUIREMENTS	0.34	1.08	0.67	0.46	1.34	2.13	3.00	3.07	2.85	3.06	2.46	2.04	2.19

Source: Gibbs & Hill, Inc.

TABLE B-6

SOCIAL SERVICE AND DETENTION FACILITY NEEDS IN ASHLEY VALLEY GENERATED BY WRSP DIRECT IMPACTS - 1985, 1989 AND 1994

	1985	1989	1994
DETENTION FACILITIES			
Jail cells required at 1.5 cells/1,000 pop.	1.3	8.7	6.2
SOCIAL SERVICES			
Alcohol Rehabilitation counselors required at 1 counselor/10,000 pop.	0.1	0.6	0.4
Youth employment counselors at 1 counselor /10,000 pop.	0.1	0.6	0.4
Youth Guidance Homes at 1 facility/50,000 pop.	-	0.1	0.1
Day Care Centers at 1 center/5,000 pop.	0.2	1.2	0.8

Source: Gibbs & Hill, Inc.

TABLE B-7

RECREATIONAL LAND AREA NEEDS GENERATED BY WRSP IMPACTS IN ASHLEY VALLEY, 1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
WRSP-GENERATED POPULATION	647	2033	1267	871	2532	4013	5651	5801	5384	5781	4641	3765	4132
PLAYGROUNDS (1.5/1000 pop)	.97	3.05	1.90	1.31	3.80	6.03	8.48	8.70	8.08	8.67	6.96	5.65	6.19
NEIGHBORHOOD PARK (2/1000 pop)	1.29	4.07	2.53	1.74	5.06	8.03	11.30	11.60	10.77	11.56	9.28	7.53	8.26
COMMUNITY PARK (3/1000 pop)	1.94	6.10	3.80	2.61	7.60	12.04	16.95	17.40	16.15	17.34	13.92	11.29	12.40
COUNTY PARKS (3/1000 pop)	1.94	6.10	3.80	2.61	7.60	12.04	16.95	17.40	16.15	17.34	13.92	11.29	12.40

Source: Gibbs & Hill, Inc.

TABLE B-8

COMMERCIAL AND INDUSTRIAL LAND AREA NEEDS GENERATED BY WRSP IMPACTS IN ASHLEY VALLEY, 1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
WRSP-GENERATED POPULATION	647	2033	1267	871	2532	4013	5651	5801	5384	5781	4641	3765	4132
NEIGHBORHOOD RETAIL (.56/1000 Population)	0.36	1.14	0.71	0.49	1.42	2.25	3.16	3.25	3.02	3.24	2.60	2.11	2.31
COMMUNITY RETAIL (.32/1000 Population)	0.21	0.65	0.41	0.28	0.81	1.28	1.81	1.86	1.72	1.85	1.49	1.20	1.32
LIGHT INDUSTRY (2/1000 pop)	1.29	4.07	2.53	1.74	5.06	8.03	11.30	11.60	10.77	11.56	9.28	7.53	8.26
HEAVY INDUSTRY (10/1000 pop)	6.47	20.33	12.67	8.71	25.32	40.13	56.51	58.01	53.84	57.81	46.41	37.65	41.32
TOTAL ACRES NEEDED	8.33	26.19	16.32	11.22	32.61	51.69	72.78	74.72	69.35	74.46	59.78	48.49	53.21

Source: Gibbs & Hill, Inc.

TABLE B-9

UTILITY NEEDS GENERATED BY WRSP IMPACTS IN ASHLEY VALLEY, 1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
WRSP-GENERATED POPULATION	647	2033	1267	871	2632	4013	5651	5801	5384	5781	4641	3765	4132
WATER DISTRIBUTION													
MGD @2000 gal/day/person	0.130	0.41	0.25	0.17	0.51	0.80	1.13	1.16	1.08	1.16	0.93	8.75	0.83
WASTEWATER COLLECTION													
MGD @100 gal/day/person	0.065	0.20	0.13	0.087	0.25	0.40	0.57	0.58	0.54	0.58	0.46	0.38	0.41
Total Acres Required	0.19	0.61	0.38	0.26	0.76	1.20	1.70	1.74	1.62	1.73	1.39	1.13	1.24
SOLID WASTE DISPOSAL													
Acres @ .08/1000 pop.	.05	.16	.10	.07	.20	.32	.45	.46	.43	.46	.37	.30	.33
ELECTRICITY													
1000 kWh @2300 kWh/ year/person	1488	4676	2914	2003	5824	9230	12997	13340	12383	13296	10674	8659	9504
TELEPHONE SERVICE													
Connections @.98 connections/household	452	1440	860	460	1464	2567	3845	3868	3297	3452	2502	1788	2031

Source: Gibbs & Hill, Inc.

TABLE B-10

SOLID WASTE COLLECTION AND NATURAL GAS SERVICE NEEDS IN ASHLEY VALLEY GENERATED BY WRSP DIRECT IMPACT - 1985, 1989, AND 1994

	1985	1989	1994
SOLID WASTE COLLECTION			
Collection time required at 1 minute/household	5 hours	30 hours	26 hours
Employees required at 40 hours/employee and 2 employees/vehicle	0.2	1.6	1.4
Solid waste generated at 1.6 cu. yards/person/year	1391.5	9282.4	6610.9
NATURAL GAS			
Cubic feet required at 35/mcf*/1,000 pop/year	30.4	203.1	144.6

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* Million cubic feet

Source: Gibbs & Hill, Inc.

TABLE B-11

EDUCATIONAL NEEDS IN UINTAH COUNTY
GENERATED BY BASELINE GROWTH -
1985, 1989, AND 1994

	1985	1989	1994
UINTAH COUNTY POPULATION	22,677	23,977	24,069
ACRES REQUIRED (@6/1000 pop)	136.1	143.9	144.41
TOTAL UINTAH COUNTY SCHOOL PUPILS	6,018	6,364	6,388
TEACHERS REQUIRED (@25 teachers/pupil)	240.72	254.56	255.52
CLASSROOMS REQUIRED (@30 pupils/room)	200.60	212.13	212.93

Source: Gibbs & Hill, Inc.

TABLE B-12

COMMUNITY FACILITY NEEDS IN UINTAH COUNTY
GENERATED BY BASELINE GROWTH -
1985, 1989, AND 1994

	1985	1989	1994
UINTAH COUNTY POPULATION	22,677	23,977	24,069
LIBRARY			
Books (@3/capita)	7,559	7,992	8,023
Acres (@.14/1000 pop)	3.17	3.36	3.37
Floor (@600sf/1000 pop)	13,606	10,386	14,441
Employees (@.28/1000 pop)	6.35	6.71	6.74
POLICE PROTECTION			
Vehicles (@.4/1000 pop)	9.07	9.59	9.63
Officers (@2.3/1000 pop)	52.15	55.14	55.35
Acres (@.06/1000 pop)	1.36	1.44	1.44
FIRE PROTECTION			
Pumpers (@.1/1000 pop)	2.27	2.39	2.41
Trucks (@.1/1000 pop)	2.27	2.39	2.41
Firemen (@1.3/1000 pop)	29.48	31.17	31.29
Acres (@.08/1000 pop)	1.81	1.92	1.99
MEDICAL SERVICES			
Beds (@4/1000 pop)	90.71	95.91	96.27
Acres (@.25/1000 pop)	5.67	5.99	6.02
Doctors (@1.88/1000 pop)	42.63	45.07	45.25
TOTAL LAND AREA REQUIREMENTS (Acres)	12.02	12.70	12.83

Source: Gibbs & Hill, Inc.

TABLE B-13

SOCIAL SERVICE AND DETENTION FACILITY NEEDS IN UINTAH COUNTY
GENERATED BY BASELINE GROWTH -
1985, 1989, AND 1994

	1985	1989	1994
DETENTION FACILITIES			
Jail cells required at 1.5 cells/1,000 pop.	34	36	36
SOCIAL SERVICES			
Alcohol rehabilitation counselors required at 1 counselor/10,000 pop.	2	2	2
Youth employment counselors required at 1 counselor/ 10,000 pop.	2	2	2
Youth guidance home at 1 facility/50,000 pop.	0.4	0.5	0.5
Day care centers at 1 center/5,000 pop.	4	5	5

Source: Gibbs & Hill, Inc.

TABLE B-14

RECREATIONAL LAND NEEDS IN UINTAH COUNTY
GENERATED BY BASELINE GROWTH -
1985, 1989, AND 1994

	1985	1989	1994
UINTAH COUNTY POPULATION	22,677	23,977	24,069
PLAYGROUNDS Acres @1.5 acres/1000 population	34.01	35.96	36.10
NEIGHBORHOOD PARKS Acres @2.0 acres/1000 population	45.35	47.95	48.14
COMMUNITY PARK Acres @3.0 acres/1000 population	68.03	71.93	72.20
COUNTY PARKS Acres @3.0 acres/1000 population	215.42	227.77	228.64

Source: Gibbs & Hill, Inc.

TABLE B-15

COMMERCIAL AND INDUSTRIAL LAND NEEDS IN UINTAH COUNTY
GENERATED BY BASELINE GROWTH -
1985, 1989, AND 1994

	1985	1989	1994
UINTAH COUNTY POPULATION	22,677	23,977	24,069
NEIGHBORHOOD RETAIL Acres @0.56 acres/1000 population	12.70	13.43	13.48
COMMUNITY RETAIL Acres @0.32 acres/1000 population	7.26	7.67	7.70
LIGHT INDUSTRY Acres @2.0 acres/1000 population	45.35	47.95	48.14
HEAVY INDUSTRY Acres @10.0 acres/1000 population	226.77	239.77	240.69
TOTAL ACREAGE NEEDS	292.08	308.82	310.01

Source: Gibbs & Hill, Inc.

TABLE B-16

UTILITY NEEDS IN UINTAH COUNTY
GENERATED BY BASELINE GROWTH -
1985, 1989 AND 1994

	1985	1989	1994
ASHLEY VALLEY BASELINE POPULATION	17,617	18,627	18,698
WATER DISTRIBUTION MGD @200 gal/day/person	3.5	3.7	3.7
WASTEWATER COLLECTION MGD @100 gal/day/person	1.8	1.9	1.9
SOLID WASTE DISPOSAL Acres @0.08 acres/1000 population	1.41	1.49	1.49
TELEPHONE SERVICE Connections @0.98 connections/household	17,265	18,254	18,324
ELECTRICITY Power @2300 kWh/year/person (in 1,000's)	40,519	42,842	43,005

Source: Gibbs & Hill, Inc.

TABLE B-17

SOLID WASTE COLLECTION AND NATURAL GAS SERVICE NEEDS IN ASHLEY VALLEY GENERATED BY BASELINE GROWTH - 1985, 1989, AND 1994

	1985	1989	1994
SOLID WASTE COLLECTION			
Collection time required at 1 minute/household	85.4 hours	90.9 hours	90.6 hours
Employees required at 40 hours/employee and 2 employees per vehicle	4.2	4.6	4.6
Solid waste generated at 1.6 cu. yards/person/ year	28,187	30,018	30,349
NATURAL GAS			
Cubic feet required at 35 mcf*/1,000 pop/year	616.6	656.6	663.9

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* Million cubic feet

Source: Gibbs & Hill, Inc.

TABLE B-18

EDUCATIONAL NEEDS IN UINTAH COUNTY
GENERATED BY CUMULATIVE PROJECTS' GROWTH -
1985, 1989, AND 1994

	1985	1989	1994
UINTAH COUNTY POPULATION	8,166	28,741	20,896
ACRES (@6 acres/1000 population)	48.9	172.4	125.3
UINTAH COUNTY-GENERATED PUPILS	1,721	7.110	4,523
TEACHERS REQUIRED (@25 pupils/teacher)	68.8	244.4	180.9
CLASSROOMS REQUIRED (@30 pupils/room)	57.4	203.7	150.8

Source: Gibbs & Hill, Inc.

TABLE B-19

COMMUNITY FACILITY NEEDS IN UINTAH COUNTY
GENERATED BY CUMULATIVE PROJECTS' GROWTH -
1985, 1989 AND 1994

	1985	1989	1994
UINTAH COUNTY POPULATION	8,166	28,741	20,896
LIBRARY			
Books @3/capita	2,722	9,580	6,965
Acres @.14 ac/1000 population	1.14	4.02	2.92
Floor @600 sf/1000 population	4,899.6	17,244.6	12,537.6
Employees @.28/1000 population	2.29	8.04	5.85
POLICE PROTECTION			
Vehicles @.4/1000 population	3.27	11.50	8.36
Officers @2.3/1000 population	18.78	66.10	48.06
Acres @.06 acre/1000 population	0.49	1.72	1.25
FIRE PROTECTION			
Pumpers @.1/1000 population	0.82	2.87	2.09
Trucks @.1/1000 population	0.82	2.87	2.09
Firemen @1.3/1000 population	10.61	37.36	27.16
Acres @.08 acres/1000 population	0.65	2.29	1.68
MEDICAL SERVICES			
Beds @4.1000 population	32.66	114.96	83.58
Acres @.25 acres/1000 population	2.04	7.18	5.22
Doctors @1.88/1000 population	15.35	54.03	39.28
TOTAL ACREAGE NEED	4.33	15.22	11.07

Source: Gibbs & Hill, Inc.

TABLE B-20

SOCIAL SERVICE AND DETENTION FACILITY NEEDS IN UINTAH COUNTY
GENERATED BY CUMULATIVE PROJECTS' GROWTH -
1985, 1989, AND 1994

	1985	1989	1994
DETENTION FACILITIES			
Jail cells required at 1.5 cells/1,000 pop.	12.2	43.0	31.3
SOCIAL SERVICES			
Alcohol rehabilitation counselors required at 1 counselor/10,000 pop.	0.8	2.9	2.1
Youth employment counselor at 1 counselor/10,000 pop.	0.8	2.9	2.1
Youth guidance home at 1 facility/50,000 pop.	0.2	0.6	0.4
Day care centers at 1 center/5,000 pop.	1.6	5.7	4.2

Source: Gibbs & Hill, Inc.

TABLE B-21

RECREATIONAL LAND NEEDS IN UINTAH COUNTY
GENERATED BY CUMULATIVE PROJECTS' GROWTH -
1985, 1989, AND 1994

	1985	1989	1994
UINTAH COUNTY POPULATION	8,166	28,741	20,896
PLAYGROUNDS Acres @1.5 acres/1000 population	12.25	43.11	31.34
NEIGHBORHOOD PARK Acres @2.0 acres/1000 population	16.33	57.48	41.79
COMMUNITY PARK Acres @3.0 acres/1000 population	24.50	86.22	62.69
COUNTY PARKS Acres @3.0 acres/1000 population	24.50	86.22	62.68
TOTAL ACREAGE NEED	75.58	273.03	198.51

Source: Gibbs & Hill, Inc.

TABLE B-22

COMMERCIAL AND INDUSTRIAL LAND NEEDS IN UINTAH COUNTY
GENERATED BY CUMULATIVE PROJECTS' GROWTH -
1985, 1989, AND 1994

	1985	1989	1994
UINTAH COUNTY POPULATION	3,166	28,741	20,896
NEIGHBORHOOD RETAIL Acres @0.56 acres/1000 population	4.57	16.09	11.70
COMMUNITY RETAIL Acres @0.12 acres/1000 population	2.61	9.19	6.69
LIGHT INDUSTRY Acres @2.0 acres/1000 population	16.33	57.48	41.79
HEAVY INDUSTRY Acres @10.0 acres/1000 population	81.66	287.41	208.96
TOTAL ACREAGE NEED	105.17	370.17	269.14

Source: Gibbs & Hill, Inc.

TABLE B-23

UTILITY NEEDS IN ASHLEY VALLEY
GENERATED BY CUMULATIVE PROJECTS' GROWTH -
1985, 1989, AND 1994

	1985	1989	1994
ASHLEY VALLEY POPULATION	5,260	19,738	16,299
WATER DISTRIBUTION MGD @200 gal/day/person	1.05	3.94	3.25
WASTEWATER COLLECTION MGD @100 gal/day/person	0.53	1.97	1.62
WASTE DISPOSAL Acres @.08 acres/1000 population	0.42	1.58	1.30
ELECTRICITY Power @2300 kWh/year/person (in 1,000's)	12,098	45,397	37,487
TELEPHONE SERVICE Connections @.93 connections/household	5,155	19,343	15,973

Source: Gibbs & Hill, Inc.

TABLE B-24

SOLID WASTE COLLECTION AND NATURAL GAS SERVICE NEEDS IN ASHLEY VALLEY GENERATED BY CUMULATIVE PROJECTS' GROWTH - 1985, 1989, AND 1994

	1985	1989	1994
SOLID WASTE COLLECTION			
Collection time required at 1 minute/household	28.4 hours	112.4 hours	101.4 hours
Employees required at 40 hours/employee and 2 employees/vehicle	1.4	5.6	5.0
Solid waste generated at 1.6 cu. yards/person/year	8416	31,581	26,078
NATURAL GAS			
Cubic feet required at 35 mcf*/1,000 pop/year	184.0	690.5	627.5

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* Million cubic feet

Source: Gibbs & Hill, Inc.

TABLE B-25

EDUCATIONAL NEEDS GENERATED BY WRSP DIRECT IMPACTS IN RANGELY, COLORADO - 1985, 1989, AND 1994

	1985	1989	1994
WRSP DIRECT POPULATION IN RANGELY	220	1927	1261
ACRES REQUIRED (@6 ac/1000 population)	1.32	11.56	7.57
TOTAL WRSP DIRECT SCHOOL PUPILS IN RANGELY	51.91	387.69	267.70
TEACHERS REQUIRED (@25 pupils/teacher)	2.07	15.50	10.71
CLASSROOMS REQUIRED (@30 pupils/room)	1.73	12.92	8.92

Source: Gibbs & Hill, Inc.

TABLE B-26

COMMUNITY FACILITY NEEDS IN RANGELY
GENERATED BY WRSP DIRECT IMPACTS -
1985, 1989, AND 1994

	1985	1989	1994
RANGELY WRSP DIRECT POPULATION	220	1,927	1,261
LIBRARY			
Books @3/capita	73.30	642.33	420.33
Acres @.14 acres/1000 population	0.03	0.27	0.18
Floor @600 sf/1000 population	132.0	1,166.0	756.6
Employees @0.28/1000 population	0.06	0.54	0.35
POLICE PROTECTION			
Vehicles @.4/1000 population	0.09	0.77	0.50
Officers @2.3/1000 population	0.51	4.43	2.90
Acres @.06 acres/1000 population	0.01	0.12	0.08
FIRE PROTECTION			
Pumpers @.1/1000 population	0.02	0.19	0.13
Trucks @.1/1000 population	0.02	0.19	0.13
Firemen @1.3/1000 population	0.29	2.50	1.64
Acres @.08 acres/1000 population	0.02	0.15	0.10
MEDICAL SERVICES			
Beds @4/1000 population	0.88	7.71	5.04
Doctors @1.88/1000 population	0.41	3.62	2.37
TOTAL ACREAGE NEED	0.11	1.02	0.67

Source: Gibbs & Hill, Inc.

TABLE B-27

RECREATIONAL LAND NEEDS IN RANGELY
GENERATED BY WRSP DIRECT IMPACTS -
1985, 1989, AND 1994

	1985	1989	1994
WRSP DIRECT POPULATION IN RANGELY	220	1,927	1,261
PLAYGROUNDS Acres @1.5/1000 population	0.33	2.89	1.89
NEIGHBORHOOD PARKS Acres @2.0/1000 population	0.44	3.85	2.52
COMMUNITY PARK Acres @3.0/1000 population	0.66	5.78	3.78
COUNTY PARKS Acres @3.0/1000 population	0.66	5.78	3.78
TOTAL ACREAGE NEED	2.09	18.30	11.97

Source: Gibbs & Hill, Inc.

TABLE B-28

COMMERCIAL AND INDUSTRIAL LAND NEEDS IN RANGELY
GENERATED BY WRSP DIRECT IMPACTS -
1985, 1989, AND 1994

	1985	1989	1994
WRSP DIRECT POPULATION IN RANGELY	220	1,927	1,261
NEIGHBORHOOD RETAIL Acres @.56/1000 population	0.12	1.08	0.71
COMMUNITY RETAIL Acres @.32/1000 population	0.07	0.62	0.40
LIGHT INDUSTRY Acres @2.0/1000 population	0.44	3.85	2.52
HEAVY INDUSTRY Acres @10/1000 population	2.20	19.27	12.61
TOTAL ACREAGE NEED	2.83	24.82	16.24

Source: Gibbs & Hill, Inc.

TABLE B-29

UTILITY NEEDS IN RANGELY
GENERATED BY WRSP DIRECT IMPACTS -
1985, 1989, AND 1994

	1985	1989	1994
WRSP DIRECT POPULATION IN RANGELY			
WATER DISTRIBUTION MGD @200 gal/day/person	0.04	0.39	0.25
WASTEWATER COLLECTION MGD @100 gal/day/person	0.02	0.19	0.13
WASTE DISPOSAL Acres @.08 acres/1000 population	0.18	0.15	0.10
ELECTRICITY Power @2300 kWh/hear/person (in 1,000's)	506.0	4,432.0	2,900.0
TELEPHONE SERVICE Connections @.93 connections/household	215.6	1,888.0	1,236.0

Source: Gibbs & Hill, Inc.

APPENDIX C

PROJECTIONS OF POPULATION AND EMPLOYMENT GROWTH FOR UINTAH COUNTY AND THE ASHLEY VALLEY

In order to estimate facility needs, Gibbs & Hill has prepared a projection of employment and population growth in the Ashley Valley and Uintah County for the period 1980-1994.

The result of the projections is that County population, which was 20,504 in 1980; is expected to peak at 54,439 in 1990, and to level off at 44,965 by 1994. The population in Ashley Valley, 16,008 in 1980, would peak at 40,469 in 1990 and level off at 34,997 by 1994. Uintah County schoolchildren, of whom there were 5,429 in 1980, will peak at 12,887 in 1990 and level off at 10,911 by 1994.

The derivation of these projections is based on a large number of assumptions regarding the pace of growth in oil shale development and the characteristics of the incoming population. Growth in labor force, households, population and schoolchildren generated by the oil shale projects was estimated separately for each year in the forecast period. It was then added to a baseline projection for the Uintah County and the Ashley Valley provided by the Utah State Planning Coordinator's Office in Energy 2000, page 10, November, 1980.

EMPLOYMENT

Direct construction and operation personnel for WRSP and other energy projects were estimated by project developers. Employment multipliers were estimated by Gibbs & Hill, based on a survey of the literature. Results are tabulated in Table C-1.

POPULATION

Since construction workers are expected to have different family characteristics than other employees, it is necessary to treat each group separately and then add them together, in order to calculate households, population, and schoolchildren generated by the increase in employment.

Table C-2 shows a profile of the direct population associated with construction workers based on the estimate that 50 percent will be family status, with 3.5 persons per family and 1.0 schoolchild per family. Half the spouses are estimated to participate in the labor force.

In Table C-3, direct operating and all secondary employment is aggregated to determine employment not covered in the previous table. The sum is adjusted to account for jobs taken by construction spouses. The remaining jobs to be filled will generate in-migration of households which are estimated by Gibbs & Hill, based on a literature search, to include 20 percent single status and 80 percent family status. Of these families, 50 percent of the spouses are expected to be in the labor force, and average family size is estimated at 3.1. When single households are added to families, the ratios are 1.4 jobs per household and 2.68 persons per household. Two-thirds of the non-adult family members are estimated to be schoolchildren, so the ratio of school children per household for this population is 0.58.

These ratios are estimates based on Gibbs & Hill's survey of the literature and are suitable for planning purposes.

The projections in the previous tables C-2 and C-3 are added in Table C-4. The result is an estimate of the total employment and population growth generated by the energy projects.

UINTAH COUNTY

Regional growth was apportioned to Uintah County on the basis of the assumption that all single construction workers and 76 percent of all other households will reside in the county.

Gibbs & Hill applied a gravity model with the result that 76 percent was assigned to the Ashley Valley and potentially 24 percent to Rangely (Appendix F). Based on these results, for part of the growth, and the location of most projects in remote parts of the county, it appeared reasonable to assume that 76 percent of the newcomers for all projects will reside in the county, and 24 percent will reside in adjacent counties. (The exception is single construction workers, all of whom are assumed to live in a camp in Uintah County.)

Population growth assigned to Uintah County is shown in Table C-5. This table includes 76 percent of all items in the previous table. It reflects the assumption that 76 percent of all households will live in Uintah County except for single construction workers. To account for the single construction workers, the 24 percent subtracted by the first calculation is restored in a second calculation.

The Utah State Planning Coordinator's Office has made a baseline projection of population growth in the Uintah Basin and Uintah County. Under the assumption that the ratio of labor force, households, and schoolchildren to population remains stable from 1981 through 1994, Gibbs & Hill assigned growth of these variables through the forecast period. These are shown on Table C-6.

The assumption results in an estimate of schoolchildren that is slightly below the state's estimate for 1994. The state's estimate assumes that local birth rates hold steady over the next ten years in line with recent local trends; the Gibbs & Hill estimate assumes a slight drop in

birth rates in line with national trends. The population, employment, and labor force estimates are consistent with the state projection.

The county baseline projections (Table C-6) and the growth projections (Table C-5) are added together in Table C-7 to result in a projection of county population, households, labor force, and schoolchildren. (Note that the labor force estimate is approximate as it is not adjusted for unemployment in the newcomer population.)

ASHLEY VALLEY

County growth is apportioned to the Ashley Valley and added to the baseline projection. Baseline population projections for the Ashley Valley are shown in Table C-8. In 1980, the Ashley Valley contained 47 percent of the Uintah Basin population. The ratio was assumed by Gibbs & Hill to continue in the forecast period to yield Ashley Valley baseline population estimates. The 1980 ratios of 3.44 persons per household and 1.45 labor force members per household were also assumed constant in the forecast period.

Population growth generated by all energy projects in the Ashley Valley are shown in Table C-9. In 1980, the Ashley Valley had 78 percent of Uintah County residents. Gibbs & Hill assumed the Ashley Valley, as the dominant residential area in the county, would attract the same proportion, 78 percent, of new county residents that it contained in 1980. The sole exception was the single construction workers, all of whom were assumed to live in a camp near the project sites.

(Note that Gibbs & Hill assumes elsewhere that 100 percent of the direct WRSP employees in Uintah County (excluding the temporary construction workers) will choose to live in the Ashley Valley. For secondary employees and direct employees of other projects, it is expected that

somewhat less than 78 percent will live in Ashley Valley such that the combination will equal 78 percent).

Population projections for the Ashley Valley are shown in Table C-10. The baseline and energy-induced growth in the previous tables C-8 and C-9 were added to result in population, household and labor force estimates for the Ashley Valley.

TABLE C-1

DIRECT AND SECONDARY EMPLOYMENT
GENERATED BY ENERGY PROJECTS IN UINTAH COUNTY, 1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
DIRECT EMPLOYMENT													
CONSTRUCTION													
White River	576	1,830	1,032	346	1,032	2,390	4,037	3,797	2,938	2,879	1,618	280	0
All Other	830	1,580	2,500	2,500	2,800	3,010	2,500	3,075	2,000	1,000	500	0	0
Total	1,406	3,410	3,532	2,846	3,832	5,400	6,537	6,872	4,938	3,879	2,118	280	0
OPERATION													
White River	0	10	68	369	838	885	991	1,286	1,867	2,215	2,492	3,040	3,350
All Other	50	230	315	465	915	1,160	1,700	2,070	2,430	2,430	2,430	2,430	2,430
Total	50	240	383	834	1,753	2,045	2,691	3,356	4,297	4,645	4,922	5,470	5,780
Total Direct Employment	1,456	3,650	3,915	3,680	5,585	7,445	9,228	10,228	9,235	8,524	7,040	5,750	5,780
SECONDARY EMPLOYMENT													
CONSTRUCTION	281	1,023	1,413	1,423	2,299	3,780	5,230	6,185	4,444	3,491	1,906	252	0
Multiplier	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0.9	0.9	0.9	0.9	0.9
OPERATION	15	96	192	500	1,227	1,636	2,422	3,356	4,727	5,574	6,399	7,658	8,760
Multiplier	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
Total Secondary Employment	296	1,119	1,604	1,923	3,526	5,416	7,652	9,541	9.171	9.065	8,305	7,910	8,670
TOTAL EMPLOYMENT	1,752	4,769	5,519	5,603	9,111	12,861	16,870	19,769	18,406	17,589	15,345	13,660	14,450

Source: Gibbs & Hill, Inc.

TABLE C-2

EMPLOYEES, HOUSEHOLDS, POPULATION AND SCHOOLCHILDREN
GENERATED BY DIRECT CONSTRUCTION WORKERS IN ALL REGIONAL ENERGY PROJECTS, 1982 - 1994

	Basis	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EMPLOYMENT	From Table C-1	1,406	3,410	3,532	2,846	3,832	5,400	6,537	6,872	4,938	3,879	2,118	280	0
SINGLE EMPLOYMENT	50 Percent[1]	703	1,705	1,766	1,423	1.916	2,700	3,269	3,436	2,469	1,940	1,059	140	0
FAMILY STATUS EMPLOYMENT	50 Percent[1]	703	1,705	1,766	1,423	1,916	2,700	3,269	3,436	2,469	1,940	1,059	140	0
FAMILY POPULATION	3.5 Persons Per Family[1]	2,461	5,968	6,181	4,981	6,706	9,450	11,440	12,026	8,642	6,788	3,707	490	0
TOTAL POPULATION	2.25 Persons Per Job[1]	3,164	7,673	7,947	6,404	8,622	12,150	14,708	15,462	11,111	8,728	4,766	630	0
LABOR FORCE FROM CONSTRUCTION HOUSEHOLDS	50 Percent X Families[2]	352	853	883	712	958	1,350	1,634	1,718	1,235	970	530	70	0
SCHOOL-CHILDREN	1.0/Family[3]	703	1,705	1,766	1,423	1,916	2,700	3,269	3,436	2,469	1,940	1,059	140	0

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1. Gibbs & Hill estimate based on literature survey
2. Gibbs & Hill estimate
3. 1.5 children per family, of whom 66 percent are school-age (Gibbs & Hill survey)

Source: Gibbs & Hill, Inc.

TABLE C-3

DIRECT OPERATIONS AND SECONDARY EMPLOYEE, HOUSEHOLD, POPULATION AND SCHOOLCHILDREN GENERATED BY ALL ENERGY PROJECTS, 1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EMPLOYMENT[1]	50	240	383	834	1753	2045	2691	3356	4297	4645	4922	5470	5780
SECONDARY EMPLOYMENT[1] (Construction- & Operations-Induced)	296	1119	1604	1923	3526	5416	7652	9541	9171	9065	8305	7910	8670
SUBTOTAL	346	1359	1987	2757	5279	7461	10343	12897	13468	13710	13227	13380	14450
JOBS TAKEN BY CONSTRUCTION HOUSEHOLDS[2]	352	853	883	712	958	1350	1634	1718	1235	970	530	70	0
NET JOBS TO BE FILLED	-6	506	1104	2045	4321	6111	8709	11179	14703	12740	12697	13310	14450
HOUSEHOLDS[3]	-4	359	784	1452	3068	4339	6183	7937	10439	9045	9015	9450	10260
POPULATION[4]	-11	963	2101	3391	8222	11628	16571	21271	27977	24242	24160	25326	27495
SCHOOLCHILDREN[5]	-2	208	455	842	1779	2517	3586	4604	6055	5246	5229	5481	5951

---

1. From Table C-1
2. From Table C-2
3. 0.71 households/job -- based on Gibbs & Hill literature survey of operations employment, assume 20 percent single, 80 percent family status; of the latter, assume 50 percent of spouses in labor force; therefore, 100 households include 140 workers.
4. 2.68 persons/household -- 3.1 persons/family and 80 percent family status.
5. 0.58 schoolchildren/household -- 1.1 children/family, 66 percent school-age, 80 percent households family status.

Source: Gibbs & Hill, Inc.

TABLE C-4

EMPLOYMENT, HOUSEHOLDS, POPULATION AND SCHOOLCHILDREN
GENERATED BY ENERGY PROJECTS, 1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EMPLOYMENT[1]	1752	4769	5519	5603	9111	12861	16880	19769	18406	17589	15345	18660	14450
HOUSEHOLDS[2]													
Direct Construction	1406	3410	3532	2846	3832	5400	6537	6872	4938	3879	2118	280	0
Non-construction	-4	359	784	1452	3068	4339	6183	7937	10439	9045	9015	9450	10260
Total Households	1402	3769	4316	4298	6900	9739	12720	14809	15377	12824	11133	9730	10260
POPULATION[3]													
Direct Construction	3164	7673	7947	6404	8622	12150	14700	15462	11111	8728	4766	630	0
Non-construction	-11	963	2101	3891	8222	11628	16571	21271	27977	24242	24160	25326	27495
Total Population	3153	8636	10048	10295	16844	23778	31279	36732	39088	32970	28926	25956	27495
SCHOOLCHILDREN[3]													
Direct Construction	703	1705	1766	1423	1916	2700	3269	3436	2469	1940	1059	140	0
Non-construction	-2	208	455	842	1779	2517	3586	4604	6055	5246	5229	5481	5951
Total Schoolchildren	701	1913	2221	2265	3695	5217	6855	8040	8524	7186	6288	5641	5951

---

1. Employment taken from Table C-1
2. Direct Construction from Table C-1; Non-construction from Table C-3
3. Direct Construction from Table C-2; Non-construction from Table C-3

Source: Gibbs & Hill, Inc.

TABLE C-5

GROWTH IN POPULATION, HOUSEHOLDS, LABOR FORCE AND SCHOOLCHILDREN
ASSIGNED TO UINTAH COUNTY, 1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
POPULATION*													
0.76 x Table C-4	2396	6563	7636	7824	12801	18071	23772	27916	29707	25057	21984	19727	20896
0.24 x Table C-2	169	409	424	342	460	748	785	825	593	466	254	34	0
	2565	6972	8060	8166	13261	18719	24557	28741	30290	25523	22238	19761	20896
HOUSEHOLDS													
0.76 x Table C-4	1065	2864	3280	3266	5244	7402	9667	11255	11687	9746	8461	7395	7798
0.24 x Table C-2	169	409	424	342	460	748	785	825	593	466	254	34	0
	1235	3273	3704	3608	5704	8050	10452	12080	12280	10212	8715	7429	7798
LABOR FORCE													
0.76 x Table C-4	1331	3624	4194	4258	6924	9774	12829	15024	13988	13367	11662	10382	10982
0.24 x Table C-2	169	409	424	342	460	648	785	825	593	466	254	34	0
	1500	4033	4618	4600	7384	10422	13614	15849	14581	13833	11916	10416	10982
SCHOOLCHILDREN													
0.76 x Table C-4	533	1454	1688	1721	2808	3956	5210	6110	6478	5461	4779	4287	4523

---

* Per Gibbs & Hill gravity model (Appendix F) assign 76 percent of all growth to Uintah County, except for single construction workers, all of whom are assigned to Uintah County.

Source: Gibbs & Hill, Inc.

TABLE C-6

PROJECTIONS OF BASELINE POPULATION, HOUSEHOLDS, LABOR FORCE AND SCHOOLCHILDREN OF UINTAH COUNTY, 1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
POPULATION													
Uintah County[1] Baseline Projections x 0.605	21265	21691	22153	22677	23055	23416	23694	23977	24149	24259	24267	24193	24069
HOUSEHOLDS													
3.44 Persons/Household	6182	6305	6440	6592	6702	6807	6888	6970	7020	7052	7054	7033	6997
LABOR FORCE													
1.45 Persons/Household[2]	8964	9142	9338	9558	9718	9870	9988	10107	10179	10225	10228	10198	10146
SCHOOLCHILDREN													
0.913/Household[2]	5644	5756	5880	6018	6119	6215	6289	6364	6409	6438	6440	6421	6388

---

1. Source of baseline for Uintah Basin is Office of State Planning Coordinator, Energy, 2000 Projections, Table 1, Page 10; 1980 ratio of Uintah County to Uintah Basin was 60.5 percent.
2. 1980 ratios are applied to the forecast period.

Source: Gibbs & Hill, Inc.

TABLE C-7

PROJECTION OF POPULATION, HOUSEHOLDS, LABOR FORCE AND SCHOOLCHILDREN
IN UINTAH COUNTY, 1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
POPULATION													
Baseline (Table C-6)	21265	21691	22153	22677	23055	23416	23694	23977	24149	24259	24267	24193	24069
Growth (Table C-5)	2565	6972	8060	8166	13261	18719	24557	28741	30290	25523	22238	19761	20896
Total	23830	28663	30213	30843	36316	42135	48251	52718	54439	49782	46505	43954	44965
HOUSEHOLDS													
Baseline (Table C-6)	6182	6305	6440	6592	6702	6807	6888	6970	7020	7052	7054	7033	6997
Growth (Table C-5)	1235	3273	3704	3608	5704	8050	10452	12080	12280	10212	8715	7429	7798
Total	7417	9578	10144	10200	12407	14857	17340	19050	19300	17264	15769	14462	14795
LABOR FORCE													
Baseline (Table C-6)	8964	9142	9338	9558	9718	9870	9988	10107	10179	10225	10228	10198	10146
Growth (Table C-5)	1500	4033	4618	4600	7384	10422	13614	15849	14581	13833	11916	10416	10982
Total	10464	13175	13956	14158	17102	20292	23602	25956	24760	24058	22144	20614	21128
SCHOOLCHILDREN													
Baseline (Table C-6)	5644	5756	5880	6018	6119	6215	6289	6364	6409	6438	6440	6421	6388
Growth (Table C-5)	533	1454	1688	1721	2808	3965	5210	6110	6478	5461	4779	4287	4523
Total	6177	7210	7568	7739	8927	10180	11499	12474	12887	11899	11219	10708	10911

Source: Gibbs & Hill, Inc.

TABLE C-8

BASELINE POPULATION AND PROJECTIONS FOR
ASHLEY VALLEY, 1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
POPULATION													
Uintah County Baseline[1] Projections x 47 Percent	16520	16851	17210	17617	17911	18191	18407	18627	18761	18846	18852	18794	18698
TOTAL HOUSEHOLDS													
3.44 Persons/Household[2]	4802	4898	5003	5121	5207	5288	5351	5415	5454	5478	5480	5463	5435
TOTAL LABOR FORCE													
1.45 Workers/Household[2]	6963	7103	7254	7426	7550	7668	7759	7851	7908	7944	7946	7922	7881

---

1. Source of baseline for Uintah Basin is the Office of State Planning Coordinator, Energy: 2000 Projections, Page 10, Table 1; 47 percent of Uintah Basin population in 1980 was in Ashley Valley.
2. 1980 ratios are applied to forecast period

Source: Gibbs & Hill, Inc.

TABLE C-9

PROJECTIONS OF POPULATION, HOUSEHOLDS, AND LABOR FORCE IN ASHLEY VALLEY GENERATED BY ALL REGIONAL ENERGY PROJECTS, 1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
POPULATION[1]	2396	6563	7636	7824	12801	18071	23772	27916	29707	25057	21984	19727	20896
	- 534	-1294	-1342	-1001	-1456	-2052	-2484	-2611	-1876	-1474	- 805	- 106	- 0
	1862	5269	6294	6743	11345	16019	21288	25305	27831	23583	21179	19621	20896
	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78
	1452	4110	4909	5260	8849	12495	16605	19738	21708	18395	16520	15304	16299
HOUSEHOLDS[2]	1065	2864	3280	3266	5244	7402	9667	11255	11687	9746	8461	7395	7798
	- 534	-1294	-1342	-1081	-1456	-2052	-2484	-2611	-1876	-1474	- 805	- 106	- 0
	531	1570	1938	2185	3788	5350	7183	8644	9811	8272	7656	7289	7798
	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78
	414	1225	1512	1704	2955	4173	5603	6742	7653	6452	5972	5685	6082
LABOR FORCE[2]	1331	3624	4194	4258	6924	9774	12829	15024	13988	13367	11662	10382	10982
	- 534	-1294	-1342	-1081	-1456	-2052	-2484	-2611	-1876	-1474	- 805	- 106	- 0
	797	2330	2852	3176	5468	7722	10345	12413	12112	11893	10857	10276	10982
	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78	x .78
	622	1817	2225	2477	4265	6023	8069	9682	9447	9277	8468	8015	8566

---

1. County totals are from Table C-5; subtract out single construction workers (Table C-2). Assign 78 percent of remaining workers to Ashley Valley. Gibbs & Hill gravity model (Appendix F) results applied to all projects; see text for further explanation
2. County totals are from Table C-5

Source: Gibbs & Hill, Inc.

TABLE C-10

SUMMARY PROJECTIONS OF POPULATION, HOUSEHOLDS, AND LABOR FORCE IN ASHLEY VALLEY, 1982 - 1994

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
POPULATION													
Baseline (Table C-8)	16520	16851	17210	17617	17911	18191	18407	18627	18761	18846	18852	18794	18698
Growth (Table C-9)	1452	4110	4909	5260	8849	12495	16605	19738	21708	18395	16520	15304	16299
Total	17972	20961	22119	22877	26760	30686	35012	38365	40469	37241	35372	34098	34997
HOUSEHOLDS													
Baseline (Table C-8)	4802	4898	5003	5121	5207	5288	5351	5415	5454	5478	5480	5463	5415
Growth (Table C-9)	414	1225	1512	1704	2955	4173	5603	6742	7653	6452	5972	5685	6082
Total	5216	6123	6515	6825	8162	9461	10953	12157	13107	11930	11452	11148	11517
LABOR FORCE													
Baseline (Table C-8)	6963	7103	7254	7426	7550	7668	7759	7851	7908	7944	7946	7922	7881
Growth (Table C-9)	622	1817	2225	2477	4265	6023	8069	9682	9447	11892	8468	8015	8566
Total	7585	8920	9479	9903	11815	13691	15828	17533	17355	19836	16414	15937	16447

Source: Gibbs & Hill, Inc.

APPENDIX D

POPULATION AND EMPLOYMENT GROWTH GENERATED BY WRSP

Using the same method described in Appendix C for all energy projects, WRSP impacts on Uintah County the Ashley Valley, and Rangely were estimated for the years 1985, 1989, and 1994.

The first six tables are modeled after tables C-1 to C-6, and follow the methodology described in Appendix C. The last table, D-7, contains the WRSP impact on Rangely.

The WRSP is expected to result in a growth of 12,111 people in the Ashley Valley by 1994, reduced slightly from a 1989 peak of 12,337. The 1989 peak in Rangely is estimated at 3,896, with a long-range permanent increase of 3,824 in 1994.

Detailed findings are described below:

EMPLOYMENT

The WRSP is expected to provide a peak of 5,083 direct construction and operation jobs in 1989, leveling off at 8,375 in 1994. (See Table D-1.)

CONSTRUCTION

Half the construction workers are expected to be single status. The other half are estimated to have a relatively large family size of 3.5 persons per household. In the peak construction year, 1989, there will be 3,797 direct construction workers and 8,543 persons in households headed by a construction worker. (See Table D-2.)

NON-CONSTRUCTION

The operations employees and secondary workers are expected to include 80 percent families, with smaller families than the construction workers. In the peak year, 1989, there will be 9,589 persons in 3,578 non-construction households. (See Table D-3.)

CONSTRUCTION AND NON-CONSTRUCTION

In sum, the WRSP will generate 18,132 persons in 7,385 households in the peak year, of whom 3,974 will be schoolchildren. By 1994, when construction workers are gone, there will be 15,935 persons in 5,946 households and 3,449 schoolchildren. (See Table D-4.)

UINTAH COUNTY

Most of the families and all the single construction workers are expected to live in Uintah County. In 1989, there will be 14,236 such persons in 6,061 households, and 3,020 schoolchildren. By 1994, there will be 12,111 persons in 4,519 households, and 2,621 schoolchildren. (See Table D-5.)

ASHLEY VALLEY

All Uintah County residents are expected to live in the Ashley Valley, with the exception of the single construction workers. The impact by 1994 is 12,111 persons in 4,579 households. The peak population in 1989 is only slightly higher than the long-term growth. (See Table D-6.)

RANGELY

About 24 percent of the direct and secondary workers (minus the single construction workers) are expected to settle in Rangely. The number of

households will peak at 1,427 in 1994. Population reaches 3,824 in 1994, including 828 schoolchildren, which is slightly below the 1989 peak. (See Table D-7.)

TABLE D-1

DIRECT AND SECONDARY EMPLOYMENT GENERATED BY WRSP IMPACT - 1985, 1989 AND 1994

	1985	1989	1994
DIRECT:			
Construction	346	3,797	---
Operations	369	1,286	3,350
Subtotal Direct	715	5,083	3,350
SECONDARY:			
Construction Multiplier*	0.5	0.9	0.9
Secondary Employment Related to Construction	173	3,417	---
Operations Multiplier*	0.6	1.0	1.5
Secondary Employment Related to Operations	221	1,286	5,025
Subtotal Secondary	394	4,703	5,025
TOTAL	1,109	9,786	8,375

---

* Gibbs & Hill Survey

Source: Gibbs & Hill, Inc.

TABLE D-2

WRSP DIRECT CONSTRUCTION EMPLOYEES, POPULATION AND SCHOOLCHILDREN
1985, 1989, AND 1994

	1985	1989	1994
CONSTRUCTION EMPLOYMENT	346	3,797	
SINGLE EMPLOYMENT (50%)[1]	173	1,899	
FAMILY STATUS EMPLOYMENT (50%)[1]	173	1,899	
FAMILY POPULATION (@3.5 persons/family)[1]	606	6,644	
TOTAL POPULATION (@2.2 persons/job)[1]	779	8,543	
LABOR FORCE FROM CONSTRUCTION HOUSEHOLDS[2]	87	950	
SCHOOLCHILDREN[3]	173	1,899	

---

1. Per Gibbs & Hill estimate based on literature survey
2. 50 percent of families, per Gibbs & Hill estimate
3. 1.0 per family -- 1.5 children per family of whom 66 percent are school-age, per Gibbs & Hill survey

Source: Gibbs & Hill, Inc.

TABLE D-3

WRSP DIRECT OPERATION'S SECONDARY EMPLOYMENT, HOUSEHOLDS, POPULATION AND SCHOOLCHILDREN - 1985, 1989, AND 1994

	1985	1989	1994
OPERATIONS EMPLOYMENT[1]	369	1,286	3,350
SECONDARY EMPLOYMENT (Construction and Operations Induced)[1]	394	4,703	5,025
Subtotal (Direct Operations and All Secondary Jobs)	763	5,989	8,375
JOBS TAKEN BY CONSTRUCTION HOUSEHOLDS[2]	87	950	
Direct Operations and All Secondary Employment[3]	676	5,039	8,375
Households[4]	480	3,578	5,946
Population[5]	1,286	9,589	15,935
Schoolchildren[6]	278	2,075	3,449

---

1. From Table D-1.
2. From Table D-2 (labor force from construction households).
3. Net jobs to be filled by persons not in direct construction households (line 3 minus line 4).
4. 0.71 households per job, based on Gibbs & Hill literature survey of operations employment; assume 20% single, 80% family status; of the latter, assume 50% of spouses in labor force. Therefore, 100 households include 140 workers.
5. 2.68 persons per household -- 3.1 persons per family and 80% family status.
6. 0.58 schoolchildren per household -- 1.1 children per family, 66% school-age, 80% households on family status = 0.58 schoolchild per household.

Source: Gibbs & Hill, Inc.

TABLE D-4

WRSP EMPLOYMENT, HOUSEHOLDS, POPULATION AND SCHOOLCHILDREN - 1985, 1989, AND 1994

	1985	1989	1994
DIRECT AND SECONDARY EMPLOYMENT[1]	1109	9786	8375
HOUSEHOLDS, DIRECT CONSTRUCTION[1]	346	3797	0
HOUSEHOLDS, NON-CONSTRUCTION[2]	480	3578	15935
Subtotal:	826	7385	15935
POPULATION, DIRECT CONSTRUCTION[3]	779	8543	0
POPULATION, NON-CONSTRUCTION[2]	1286	9589	15935
Subtotal:	2065	18132	15935
SCHOOLCHILDREN, DIRECT CONSTRUCTION[3]	173	1899	0
SCHOOLCHILDREN, NON-CONSTRUCTION[2]	278	2075	3449
Subtotal:	451	3974	3449

---

1. From Table D-1
2. From Table D-3
3. From Table D-2

Source: Gibbs & Hill, Inc.

TABLE D-5

WRSP POPULATION, HOUSEHOLDS, LABOR FORCE AND SCHOOLCHILDREN IN UINTAH COUNTY - 1985, 1989, AND 1994

	1985	1989	1994
POPULATION[1]	1569	13780	12111
	42	456	
	1611	14236	
HOUSEHOLDS[1]	628	5605	4519
	42	456	
	670	6061	
LABOR FORCE[1]	843	7437	6365
	42	456	
	885	7962	
SCHOOLCHILDREN[2]	343	3020	2621

---

1. .76 x Table D-4 plus .24 x Table D-2 (Item 2). Gibbs & Hill gravity model (Appendix F) assigns 76 percent of all growth to Uintah County, except for single construction workers, all of whom are assigned to Uintah County.
2. .76 x Table D-4

Source: Gibbs & Hill, Inc.

TABLE D-6

WRSP POPULATION, HOUSEHOLDS, LABOR FORCE, AND SCHOOLCHILDREN IN ASHLEY VALLEY - 1985, 1989, AND 1994

	1985	1989	1994
POPULATION[1]	1569	13780	12111
	-131	-1443	0
	1438	12337	12111
HOUSEHOLDS[1]	628	5605	4519
	-131	-1443	0
	497	4162	4519
LABOR FORCE[1,2]	843	7506	6365
	-131	-1443	0
	712	6063	6365
SCHOOLCHILDREN[1]	343	3020	2621

---

1. From Table D-5
2. Subtract out single construction workers

Source: Gibbs & Hill, Inc.

TABLE D-7

WRSP POPULATION, HOUSEHOLDS, LABOR FORCE AND SCHOOLCHILDREN IN RANGELY - 1985, 1989, AND 1994

	1985	1989	1994
POPULATION*	496	4,352	3,824
	- 42	- 456	- 0
	454	3,896	3,824
HOUSEHOLDS*	198	1,770	1,427
	- 42	- 456	- 0
	156	1,314	1,427
LABOR FORCE*	266	2,349	2,010
	- 42	- 456	- 0
	224	1,893	2,010
SCHOOLCHILDREN*	108	954	828

---

* .24 x Table D-4, minus .24 x Table D-2 (Item 2).

Source: Gibbs & Hill, Inc.

APPENDIX E

WRSP IMPACTS ON PUBLIC FACILITIES

Project impact on public facilities can be expressed in three ways: direct net impact, direct impact, and total impact of incoming population.

- The direct net impact is the housing and services required by those people and those dependents who work at the WRSP who did not previously reside in the region but who migrated into the region to take advantage of the economic opportunity. The number of such employees expected to reside in the Ashley Valley when construction is completed is 1,540. (See Table E-1.)

- The direct impact is the services required by all those who migrate into or choose to remain in the Ashley Valley either to work at the plant or to fill the job vacancies left by those local residents who leave their current jobs to work at the plant. Upon completion of construction, this will require 2,568 workers and 1,712 more households in the valley than there would be without the project. (See Table E-2, Item 2.)

- The direct and indirect, or total impact is the services required by all those who choose to remain in or migrate into the Ashley Valley either to work at the plant, or to fill job vacancies left by upwardly mobile local residents, or by those who take new jobs in the retail, service, and other industries that are created by the passage of the plant payroll through the local economy. Upon completion of construction, the number of direct and indirect jobs generated by the project is estimated at 8,383, which will cause the Ashley Valley to have 4,281 more households than it would have without the project. (See Table E-2.)

Project impacts on public facilities are defined in this report as direct net impacts, the requirements of those newcomers who will live in the Ashley Valley and work at the plant, because these are the needs that must be met to insure successful plant operation. (The estimates of indirect employment are approximate and somewhat speculative at this time. Total employment impacts are estimated at about 2.78 times the direct net impact.)

TABLE E-1

WRSP SOCIOECONOMIC DIRECT NET IMPACTS ON ASHLEY VALLEY

PERMANENT EMPLOYMENT	3,353
Proportion Allocated to Ashley Valley	0.766
Permanent Employees Residing in Ashley Valley	2,568
Proportion Already Residing in Ashley Valley	40%
Permanent Employees Already Residing in Ashley Valley	1,027
Proportion Incoming	60%
Permanent Employees Incoming	1,541
HOUSEHOLDS PER EMPLOYEE [1]	1.0
HOUSEHOLDS [1]	1,541
PERSONS PER HOUSEHOLD [1]	2.68
PERSONS	4,130
SCHOOLCHILDREN PER HOUSEHOLD [2]	0.581
SCHOOLCHILDREN [2]	895

---

1. Assume 80% family; 20% single, average family size 3.1 persons.
2. Assume 1.1 child per family, 0.66 children are school age; 0.726 schoolchildren per family, 0.8 families per household; and 0.5808 schoolchildren per household.

Source: Gibbs & Hill, Inc.

TABLE E-2

WRSP DIRECT NET, DIRECT AND TOTAL SOCIOECONOMIC IMPACTS, 1994

DIRECT NET IMPACT	
Operations employment	3353
In-migrants @ 60 percent	2012
Residents of Ashley Valley @ 76.6 percent	1541
Households @ 1 plant employee/household	1541
DIRECT IMPACT	
Operations employment = increase in basic jobs	3353
Ashley Valley share @ 76.6 percent	2568
Labor force increase @ 1 worker/job	2568
Household @ 1.5 workers/household	1712
TOTAL IMPACTS	
Operations employment = increase in basic jobs	3353
Employment multiplier	2.5
Total increase in basic and non-basic jobs	8383
Ashley Valley share @ 76.6 percent	6,421
Households @ 1.5 workers/household	4281
RATIO OF TOTAL EMPLOYMENT/HOUSEHOLD IMPACTS TO DIRECT NET IMPACTS	2.78

Source: Gibbs & Hill, Inc.

APPENDIX F

RESIDENTIAL SETTLEMENT PROJECTION METHODOLOGY

In attempting to project the likely distribution of direct incoming WRSP populations, Gibbs & Hill used a basic attraction-constrained model[1], one of many types of gravity models. The classical attraction constrained model assigns a portion of the total worker population to a settlement site depending upon the present population at the prospective settlement site and the distance between the work place and the prospective settlement site. In general, the equation used to estimate the worker population influx to a set of possible settlement sites is:

$$T_i = \frac{BDW_i}{d_i^{\alpha}}$$

where T_i is the total population influx to settlement site i, D is the total direct incoming WRSP population within a given year, W_i is the existing population at settlement site i, d_i is the distance between the workplace and settlement site i, and the exponent α is a parameter used to adjust the dependence of settlement preference upon the travel distance. Commonly, α is assigned a value between 1 and 3; Gibbs & Hill has assigned a value of 1 in these projections. The factor B is a normalization factor:

$$B = \Sigma_i \, [(W_i)/d_i^{\alpha})]$$

Since the population at the candidate residential sites will change each year as a result of the previous year's worker influx, Gibbs & Hill took those changes induced by WRSP populations into account annually. In making such annual incremental adjustments, the value of B is also changed.

Below are the numerical values which were used in the above equation to estimate the probable distribution of worker influx to the two principal candidate settlement sites:

Ashley Valley, Utah	W	d	D
1982	15,090	46	805
Rangely, Colorado			
1982	2,314	29	805

$$B_{1982} = \frac{1}{\frac{15,090}{46} + \frac{2,314}{29}} = 0.00245$$

Using the equation for T and incorporating the above values for B, the estimated worker influx value for 1982 becomes:

Ashley Valley, Utah

$$T_{1982}\ (A) = \frac{.00245 \times 805 \times 15,090}{46} = 647$$

Rangely, Colorado

$$T_{1982}\ (R) = \frac{.00245 \times 805 \times 2,314}{29} = 158$$

These figures show that in 1982, of the 805 incoming WRSP population, 647 will go to Ashley Valley, Utah, and 158 to Rangely, Colorado.

MODEL ASSUMPTIONS

Gravity models of some type have been used almost universally in projecting the settlement patterns of incoming populations associated with energy resource development. Gravity models are being used by the Utah State Planning Coordinator's office and by the Colorado West Council of Governments in projecting population growth impacts from projects in the region. These projects include the White River Shale Project (WRSP). Individual project operations and their consultants have also used gravity models to project their own population settlement patterns. The Moon Lake draft E.I.S. incorporates results from a gravity application by Burns and McDonald; and the 1975 Impact Study of Oil Shale Development in the Uintah Basin incorporates gravity model projections made by Western Environmental Associates, Inc.

Gravity models are used primarily because they have some track record of verification within the urban context, and the planning profession generally has not yet devised, verified, and adopted other models specifically for rural rapid growth situations.[3] Gravity models are also used in planning efforts associated with energy-impacted communities because those efforts have been limited in budget and lead time and the models can be applied with limited computer assistance, if any, and under circumstances where little refined data is available about existing communities.

Limited verification tests of gravity model applications in western growth-impacted communities have indicated that such models are much less accurate in predicting settlement patterns in rural areas than in urban areas.[4] When gravity models have been modified (expanded) to include other intervening community data, such as distance to trade centers, housing development activity and community service and infrastructure characteristics, their predictive accuracy rises considerably.

The strengths and limitations of the gravity model in general also applies to its role in the present effort of projecting WRSP-related population settlement patterns.

Determination of α

One of the major factors affecting the attraction-constrained gravity model outputs is the value placed on α, variously called a measure of settlement preference dependency or distance elasticity.

The α level is generally set somewhere between 1 and 3, depending on the analyst's assumptions about the determinant role that distance between the community and the work place may have within the workers' settlement choice decisions. The higher the value of α is assumed to be, the greater preference is given to short distances, and the more population is assigned to close settlement sites; the lower the value for α , the greater the number of people assigned to the more distant settlement sites.

A more accurate calibration of the parameter α is not readily obtainable. If cross-sectional data on a similar development project were available, a value for α could be determined by the use of regression analysis. If data are unavailable to estimate with regression analysis, the analyst must choose a value for the parameter to use with the gravity model.

In Gibbs & Hill's application of the attraction-constrained gravity model an α of 1 was used, indicating an assumption that, while short distance is still a major settlement determinant, a larger community further away can overcome some of the perceived advantages of a closer small community. More weight was thus given to existing community population by using an α equal to 1 than would have if a higher value of α had been assumed. The figures below illustrate the impact of

various values in projecting settlement distributions between Ashley Valley and Rangely.

	α 1		α 2		α 3	
	# Worker Population Added	%	# Worker Population Added	%	# Worker Population Added	%
Ashley Valley, Utah						
1982	647	80.4	579	71.9	503	62.5
Rangely, Colorado						
1982	158	19.6	223	28.1	302	37.5

INFLUENCE OF CHANGED SETTLEMENT SITE ALTERNATIVES

Within the Gibbs & Hill application of the attraction-constrained model, only two potential settlement sites were considered: Ashley Valley in Utah and Rangely, Colorado. Several of the reviewed impact studies, most notably the draft E.I.S. on Moon Lake, used more settlement site choices both within Utah and Colorado.

In an effort to determine whether the split in projected settlement distribution between Utah and Colorado would be greatly affected by the introduction of additional known settlement sites, Gibbs & Hill tested the same gravity model using 6 known settlement sites within a 75-mile radius of the WRSP project. The results of that test are shown below:

	1982	%
Vernal	347	43.1
Rangely	178	22.1
Roosevelt	123	15.3
Bonanza	112	13.9
Ballard	20	2.5
Dinosaur	25	3.1
COLORADO TOTAL	203	25.2
UTAH TOTAL	602	74.8

Through the introduction of Dinosaur, Colorado, a very small but close community, and the reduction of Ashley Valley area to Vernal, equal in distance but almost one-half the size, the total population distribution between Colorado and Utah was only affected some 4 to 5 percentage points. Utah remains the primary distribution settlement area for direct WRSP worker populations.

INFLUENCE OF INCREASED POPULATION SIZE FOR RANGELY, COLORADO

Throughout most of Gibbs & Hill's impact assessment, Ashley Valley, rather than Vernal City, is used as the primary settlement area in Utah. A test gravity model application was performed to determine the impact on projected settlement distributions of increasing the Rangely settlement site to include "Rangely area" -- population surrounding Rangely, outside its incorporated area but inside the U. S. Bureau of Census' Rangely Area Enumeration District. The area and population of Ashley Valley were held the same. The following figures were developed in this test:

Ashley Valley (1980 Population = 14,500)		%
1982	625	77.6
Rangely Area (1980 Population = 2,615)		%
1982	180	22.4

The capture rate for Rangely is only increased by 2 to 3 percent in this test.

INFLUENCE OF DECREASED SITE AREA FOR UTAH SETTLEMENT

In an effort to determine what settlement differences would be projected if Vernal City alone wre used as potential settlement site, ignoring Vernal's surrounding surburban environment, the following preliminary distributions were found:

Vernal (1980 Population = 6,600)		%
1982	533	66.2
Rangely (1980 Population = 2,100)		%
1982	272	33.8

The annual incremental population adjustments reflect an annual proportional increase in capture rate for Rangely that is not reflected otherwise.

INFLUENCE OF ADJUSTING DISTANCES TO REFLECT PROPOSED NEW VERNAL-BONANZA ROAD

Since much Uintah Basin planning is beginning to project settlement within the context of a new road, Gibbs & Hill tested the influence of this road on the population distribution pattern. Within existing

community patterns, the distance between Rangely and Bonanza is 26 miles and between Vernal and Bonanza it is 49 miles. If the new road were considered within this commuting pattern, the distance between Vernal and Bonanza would be cut to approximately 37 miles.

The gravity model was applied with this new road alternative. The incorporation of the proposed road increases the population distribution to Ashley Valley and similarly decreases the population to Rangely by 3 to 4 percent.

One of Gibbs & Hill's assumptions is that the isolation of a virtually surrounded community such as Vernal is unrealistic. When surburban areas are so closely meshed, it makes more sense that area settlemnet choices would involve the entire development area.

INFLUENCE OF ANNUAL INCREMENTAL POPULATION CHANGE ADJUSTMENTS

Some gravity model applications are limited to maintaining the original base populations within candidate settlement sites. Gibbs & Hill chose to make incremental adjustments, adding the new population to the base each year. In an effort to test what the difference in settlement distribution would have been if these annual population adjustments had not been made, the following distributions were found:

	No Incremental Population Adjustment		Annual Incremental Population Adjustment	
	#	%	#	%
Ashley Valley				
1982	665	81.4	647	80.4
1983	2,100	81.3	2,033	78.7
Rangely				
1982	150	18.6	158	19.6
1983	482	18.7	549	21.3

REFERENCES - APPENDIX F

1. E. J. Stenehjem and J. E. Metzger, A Framework for Projecting Employment and Population Changes Accompanying Energy Development, Volume II, Argonne National Laboratory, Illinois, 1980. pp. 5-10.

2. These equations are reduced from those presented by Stenejhem and Metzger on page 7 of the above reference.

3. Energy Research and Development Administration, Model and Methodologist for Assessing the Impact of Energy Development.

4. "An Assessment of the Validity of the Gravity Model for Predicting Community Settlement Patterns in Rural Energy-Impacted Areas of the West." S. H. Murdock, S. S. Wieland, and F. L. Leistritz. Land Economics, Number 54, Volume 4, November 1978. pp. 461-471.

5. J. S. Wieland, F. L. Leistritz and S. H. Murdock, Characteristics and Settlement Patterns of Energy Related Operations Workers in the Northern Great Plains, Department of Agricultural Economics, North Dakota State University, 1977.

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